1977

Independent Study by Extension

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Independent Study BY EXTENSION

Catalog 1977

University of North Carolina

Vol. LVI No. 1

HOW TO ENROLL IN AN INDEPENDENT STUDY COURSE

1. Read the General Information section of this catalog. You will be expected to know and follow all the rules and policies stated in this section.

2. Select a course. If you are completing a degree program, *check with your advisor or Academic Dean to be certain* that the course you have chosen is acceptable for your particular program.

3. Complete the application in the center of this catalog. Only one application per course is needed. Bring or mail the application and your fees to:

   Independent Study by Extension
   UNC Extension Division
   121 Abernethy Hall 002A
   Chapel Hill, NC 27514
   Tel. 919-933-1104

   No office enrollments will be accepted after 4:30 p.m. to allow our accounting office to close out for the day.

   Be sure to include postage. If you wish to purchase the texts from our bookroom, include the prices listed after the course description. Checks or money orders should be made payable to UNC Independent Study.

4. You may begin work as soon as you receive your materials. Submit your assignments as you complete them.

5. Contact Independent Study if you have problems or questions concerning any aspect of your course.

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COURSE DESCRIPTIONS

KEY TO SYMBOLS IN COURSE DESCRIPTIONS

(3 s.h.), (4 q.h.)	Indicates the hours of credit (semester hours, quarter hours)
Smith, 25, prerequisite: Latin 1 or equivalent	The instructor's name, the number of assignments in the course, and any prerequisites for the course. Prerequisites refer to courses on the campus from which the course is offered.
UNC-CH, NCSU	Code for campus offering course: ASU — Appalachian State University ECU — East Carolina University NCSU — North Carolina State University UNC-CH — University of North Carolina at Chapel Hill UNC-G — University of North Carolina at Greensboro

ANTHROPLOGY

Anth. 41
UNC-CH

AN INTRODUCTION TO ANTHROPOLOGY (3 s.h.). An examination of a broad range of questions asked by anthropologists, beginning with the central question, What does it mean to be human? The course views man as a physical and an intellectual being. *Markman, 15.*

Alland, *Evolution and Human Behavior* (1973), $2.95
Alland, *Human Diversity* (1973), $1.95
Brown, *Manchild in the Promised Land* (1965), $1.50
Chagnon, *Yanomamo, the Fierce People* (1968), $3.50
Deetz, *Invitation to Archaeology* (1967), $1.95
Downs, *Cultures in Crisis* (1971), $4.95
Farb, *Man's Rise to Civilization* (1971), $1.95
Kummer, *Primate Societies* (1971), $4.50
Kurten, *Not From the Apes* (1972), $1.25 (used only)
Lienhardt, *Social Anthropology* (1972), $2.50

ART

Art 31
UNC-CH

HISTORY OF WESTERN ART (ANCIENT & MEDIEVAL) (3 s.h.). A systematic survey of Western art from the Egyptians to Giotto. Art 31 and 32 together form a survey of the history of Western art, but Art 31 is not a prerequisite to Art 32. **Note: This course was in preparation at the time the catalog went to press; please inquire before enrolling.**

BUSINESS ADMINISTRATION

B.A. 71
UNC-CH

ACCOUNTING PRINCIPLES I (3 s.h.). Fundamental principles of financial accounting are covered and applied to the recording of business activities and to the reporting of the financial results for corporations, partnerships, and single proprietorships. *Ratliff, 24.*

Slavin and Reynolds, *Basic Accounting*, 3rd ed. (1975), $13.95
Sanders, *Student's Self-Study Guide to Accompany Basic Accounting*, 3rd ed. (1975), $5.95
Accounting Pads, set of 2, $3.60

B.A. 73
UNC-CH

INTRODUCTION TO MANAGEMENT ACCOUNTING (3 s.h.). A balanced, flexible approach to the study of the accounting function in management of retail, wholesale, selling and administrative situations, as well as manufacturing. The emphasis is on the analytical use of accounting information for planning and control. *Ratliff, 21,* **prerequisite: BA 71 or equivalent;** *Designed for non-accounting majors.*

Horngren, *Accounting for Management Control,* 3rd ed. (1974), $12.95
Accounting Pads, set of 2, $3.60

B.A. 3850
ASU

REAL ESTATE (3 s.h.). The economics of real estate, legal instruments, marketing, and management are the subjects covered. Includes valuation, appraisal, and entrepreneurship. *Weaver, 18,* **prerequisites: BE 2150, ECO 2020; prerequisites are waived for non-credit students and credit students not pursuing a degree.** This course was approved in May, 1976 by the North Carolina Real Estate Licensing Board.

O'Donnell and Maleady, *Principles of Real Estate* (1975), $13.95

CHEMISTRY

Chem. 11
UNC-CH

GENERAL CHEMISTRY (3 s.h.). Topics covered include atoms, molecules, moles, gas laws, matter with a charge, stoichiometry, elements and their periodic properties, oxidation, coordination and covalence, quantum theory and atomic structure, electronic structure and chemical properties, covalent bonding, and coordination compounds. *Hatfield and Pederson, 9.*

Dickerson, Gray, Haight, *Chemical Principles* (1970), $12.95
Lassila, *et al., Programmed Reviews of Chemical Principles* (1970), $5.50
Hutton, *A Study Guide to Chemical Principles* (1970), $3.50
Slide Rule, $1.95

Chem. 21
UNC-CH

GENERAL CHEMISTRY (3 s.h.). Topics covered include carbon compounds, nuclear chemistry, bonding in liquids and solids, energy and entropy in chemical systems, chemical equilibrium, ionic equilibria, heterogeneous equilibria, oxidation-reduction equilibria, rates and mechanisms of chemical reactions. *Hatfield and Pederson, 10,* **prerequisite: Chemistry 11.**

Same as texts for Chemistry 11

DRAMATIC ART

D.A. 15
UNC-CH

INTRODUCTION TO THE THEATRE (3 s.h.). A survey of theatre as a developing art form, this course includes dramatic literature, the history of theatre, crafts, and a review of the roots of the contemporary stage. *Geiss, 15.*

Hatlen, *Drama: Principles & Plays* (1967), $6.95
Hatlen, *Orientation to Theatre* (1972), $9.50
Chekhov, *The Cherry Orchard* (1965), $.70

D.A. 155
UNC-CH

PLAYWRITING (3 s.h.). Due to the creative nature of this course there is no set sequence of assignments. The student can expect to write one or more plays under the guidance and direction of the instructor. *Selden.*

ECONOMICS

EB 201
NCSU

ECONOMICS I (3 s.h.). An introductory study of economic activity with emphasis on national economic problems. *Thompson, 15.*

McConnel, *Economics,* 3rd ed. (1966), $7.00 (used)

EB 202
NCSU

ECONOMICS II (3 s.h.). An introductory study of the determination of prices, wages, and value; analysis of the process and principles by which an economy allocates resources. *Thompson, 18,* **prerequisite: EC 201.**

McConnel, *Economics,* 3rd ed. (1966), $7.00 (used)

ACC 260
NCSU

ACCOUNTING I — CONCEPTS OF FINANCIAL REPORTING (3 s.h.). A study of financial reporting concepts, the information generating process, income measurement, resource valuation, corporate equity measurement, and reporting practices. Includes an introduction to internal controls, and merchandising and manufacturing inventories. *McBurney, 18.*

Walgenbach, *Accounting, An Introduction* (1973), $12.95
Walgenbach, *Working Papers* (1973), $4.25

EB 307
NCSU

BUSINESS LAW I (3 s.h.). A course dealing with elementary legal concepts, agency, negotiable instruments, sales of personal property and insurance. Uniform commercial code considered under all titles applicable. *Thompson, 16,* **prerequisite: EC 201 or EC 212.**

Anderson, *Business Law,* 9th ed. (1972), $13.75

EB 308
NCSU

BUSINESS LAW II (3 s.h.). Deals with real property, bailments, partnerships, corporations, chattel mortgages on real estate, landlord and tenant, insurance, wills, suretyship, conditional sales and bankruptcy. Uniform commercial code considered under all titles applicable. *Thompson, 16,* **prerequisite: EC 307.**

Anderson, *Business Law,* 9th ed. (1972), $13.75

EDUCATION

Ed. 41
UNC-CH

EDUCATION IN AMERICAN SOCIETY (3 s.h.). The student views and evaluates the historical, political, social, and philosophical forces which affect the nature of American education; the organization and structure of the school system; and the principal issues facing American education today. *Hennis, 20.*

DeYoung and Wynn, *American Education,* 7th ed. (1972), $11.50
Ehlers, *Crucial Issues in Education,* 4th ed. (1969), $6.50
Kneller, *Introduction to the Philosophy of Education* (1971), $3.50
Postman, *The School Book,* (1973), $3.25

Ed. 71
UNC-CH

EDUCATIONAL PSYCHOLOGY (3 s.h.). Topics discussed are psychological principles pertinent to successfully guiding the growth, learning, and adjustment of children and youth. The teacher, the learner, and the teacher-learning process are studied. *Mizelle, 10.*

DeCecco. *The Psychology of Learning and Instruction: Educational Psychology,* 2nd ed. (1974), $11.95

Ed. 99
UNC-CH

THE SECONDARY SCHOOL (3 s.h.). This course emphasizes the purpose and practices of the modern secondary school in providing for the education of the adolescent boy or girl. Objectives, current issues and trends, and newer methods of instruction are included. Emphasis is given to new developments which modify the secondary school curriculum as well as methods of instruction. *Tarbet, 15.*

Alexander, Saylor and Williams, *The High School Today and Tomorrow* (1971), $8.50

EDCI 100
UNC-CH

CURRICULUM CONSTRUCTION (3 s.h.). Curriculum as a Decision Making Process is a course designed to help the student identify basic determinants of curriculum-making

and to introduce the student to various approaches or models in curriculum. The emphasis is upon applying knowledge from curriculum determinants to curriculum decision making. The course is organized around modules which list instructional goals, learning activities and readings. *Burke, 10.*

Ronald and Beatrice Gross, *Radical School Reform* (1971), $3.95
Hass, *Curriculum Planning: A New Approach* (1974), $8.50

ED 100 NCSU INTRODUCTION TO INDUSTRIAL EDUCATION (2 s.h.). The place of vocational education in a program of public education and the fundamental principles upon which this work is based. *Shore, 19.*

Roberts, *Vocational & Practical Arts Education,* 3rd ed. (1971), $13.95

EDSP 130 UNC-CH INTRODUCTION TO THE STUDY OF EXCEPTIONAL CHILDREN (3 s.h.). A comprehensive survey of the various areas of exceptionality, including the gifted. The course combines reading and study with visits and observations in the student's own community. The emphasis is on educationally related problems of adaptation for children and youth who fall into the traditional categories of mental retardation, hearing and vision limitations, and so on. *Weiss, 24.*

Kirk, *Educating Exceptional Children*, 2nd ed. (1972), $13.50
Jones, *Problems and Issues in the Education of Exceptional Children* (1971), $7.95

Ed. 156 UNC-CH MATHEMATICS IN THE ELEMENTARY SCHOOL (3. s.h.). This course deals with the organization and selection of subject matter in mathematics with modern methods of teaching the subject in the elementary school. NOTE: Education 156 is equivalent to EDCI 237 on campus. However, the independent study course may not be taken for graduate credit. *Ballew, 25.*

Ballew, *Teaching Children Mathematics* (1973), $11.50

Ed. 171 UNC-CH GROWTH AND DEVELOPMENT OF THE SCHOOL CHILD (3 s.h.). The important areas of growth and development are studied with an attempt to introduce relevant research which focuses on translation of growth and development principles into new concepts and methods as they might apply to the educational process. NOTE: Education 171 is equivalent to EDFO 101 on campus. However, the independent study course may not be taken for graduate credit. *Pryzwansky, 24.*

Hurlock, *Child Development*, 4th ed. (1964), $10.95
Baller, *Readings in the Psychology of Human Growth and Development* (1969), $4.25 (used only)
Rosenblith and Allinsmith, *The Causes of Behavior: Readings in Child Development and Educational Psychology*, 2nd ed. (1966), $5.00 (used only)

ENGLISH

Eng. 0 UNC-CH ENGLISH COMPOSITION (non-credit). Designed to improve the writing skills of individual students, English O is taught on a tutorial basis. Students submit examples of their writing to be evaluated by the instructor, who then assigns work to improve the particular problems of the student. This course may be used to remove a composition condition. *Cobbs, Leland.* Fee $73.00.

Leggett, *Prentice-Hall Handbook for Writers*, 4th ed., $5.95
Kreuzer, *Studies in Prose Writing*, 3rd ed., $6.95

Eng. 1 UNC-CH ENGLISH COMPOSITION AND RHETORIC (3 s.h.). This course emphasizes the writing of effective paragraphs and their combination into longer compositions, culminating in a study of the research paper. Coincidental to the development of writing facility will be the development of facility in the close reading of essays. *Flora, 25.*

Kane and Peters, *Writing Prose: Techniques and Purposes* (1976). $5.00

Hodges and Whitten, *Harbrace College Handbook*, 7th ed., (1972), $6.95
Upon request: *American College Dictionary* (1973), $9.95

Eng. 111 NCSU COMPOSITION AND RHETORIC (3 s.h.). Intensive study and practice in the basic forms and principles of expository communication. *Joseph, 23.*

Hodges, *Harbrace College Handbook*, 7th ed., (1972), $6.95
Levin, *Prose Models*, 2nd ed., (1970), $5.95
Upon request: *American College Dictionary* (1973), $9.95

NOTE: A student seeking degree credit at North Carolina State University may receive such credit through an independent study course for either Eng 111 or Eng 112 but not for both.

Eng. 2 UNC-CH ENGLISH COMPOSITION AND RHETORIC (3 s.h.). The purpose of English 2 is to develop fluency and effectiveness in writing and to develop critical and thoughtful reading habits. Although there is a limited review of punctuation and grammar, the emphasis is on using these for more effective writing rather than on learning basic principles. *Flora, 24.* **Eng. 1 and 2 or equivalent are prerequisite to all other Chapel Hill English courses.**

Baker, *The Practical Stylist*, 3rd ed. (1973), $4.25
Baker, *The Essayist*, 2nd ed. (1972), $3.95
Sale, *Wuthering Heights, Emily Bronte*, (Norton Critical Edition) (1963), $2.25
Upon request: *American College Dictionary* (1970), $9.95

Eng. 112 NCSU COMPOSITION AND READING (3 s.h.). Continued practice in expository writing; introduction to literary types; collateral reading. *Joseph, 18,* **Eng 111 and 112 are prerequisite to all other NCSU English courses.**

Donohue, *A Casebook on The Grapes of Wrath* (1968), $4.50
Hodges, *Harbrace College Handbook*, 7th ed. (1972), $6.95
Simonson, *Trio, A Book of Stories, Plays & Poems*, 3rd ed. (1970), $7.95
Steinbeck, *The Grapes of Wrath* (1966), $1.95
Upon request: *American College Dictionary* (1973), $9.95

NOTE: A student seeking degree credit at North Carolina State University may receive such credit through an independent study course for either Eng 111 or Eng 112 but not for both.

Eng. 21 UNC-CH ENGLISH LITERATURE (3 s.h.). This course is an introduction to English literature through the study of representative works of Chaucer, Shakespeare, and Milton. *Barnes, 25.*

Dunn, *A Chaucer Reader* (1952), $4.50
Craig, *An Introduction to Shakespeare* (1952), $4.25
Hanford, *The Poems of John Milton*, 2nd ed. (1953), $5.50
Holman, *A Handbook to Literature* (1960), paperback, $3.90

Eng. 261 NCSU ENGLISH LITERATURE I (BEGINNINGS TO 1790) (3 s.h.). A survey of English literature from the Anglo-Saxon invasion to the Romantic period. *Hargrave, 23.*

Abrams, *Norton Anthology of English Literature*, Vol. I., rev. (1968), $6.90 (used)

Eng. 22 UNC-CH ENGLISH LITERATURE (3 s.h.). English literary masterpieces of the eighteenth and nineteenth centuries from Swift through Arnold are surveyed. *Mills, 25.*

Baugh and McClelland, *English Literature: A Period Anthology* (1954), $12.00 (used only)
Shelley, *Frankenstein*, $.75
Dickens, *Great Expectations*, $.95
Defoe, *Robinson Crusoe*, $.50
Smollett, *Humphry Clinker*, paperback, $2.95

Eng. 262
NCSU

ENGLISH LITERATURE II (1790 TO PRESENT) (3 s.h.). A survey of English literature from the Romantic period to the present day. This course may be taken either as a continuation of ENG 261 or as an independent course. *Hargrave, 23.*

Abrams, *Norton Anthology of English Literature*, Vol. II, rev. (1968), $6.90 (used)
Hodges, *Harbrace College Handbook*, 7th ed. (1972), $6.95

Eng. 265
NCSU

AMERICAN LITERATURE I (BEGINNINGS TO 1850) (3 s.h.). Masterpieces of American literature in their historical settings, from the Early Colonial Period to 1850. *MacKethan, 23.*

Bradley, *American Tradition in Literature*, Vol. I (1967), $6.90 (used)
*Cooper, *The Deerslayer*, $.95
*Cooper, *The Pathfinder*, $.95
*Cooper, *Last of the Mohicans*, $.95
*Cooper, *The Prairie*, $1.25
Melville, *Moby Dick*. $.95

*Only one Cooper book is required for this course. You may choose any one of the four listed above.

Eng. 266
NCSU

AMERICAN LITERATURE II (1850 TO PRESENT) (3 s.h.). Masterpieces of American literature in their historical settings, 1850 to present. *Joseph, 23.*

Bradley, *American Tradition in Literature*, Vol. II, 3rd ed. (1967), $6.90 (used)
Dreiser, *Sister Carrie* (1962), $.95
Miller, *Death of a Salesman* (1949), $1.45
Albee, *American Dream & Zoo Story*, $.75
Oates, *Wheel of Love* (1974), $1.50

Eng. 24
UNC-CH

CONTEMPORARY LITERATURE (3 s.h.). English and American fiction, poetry, the essay during the last ten years. Emphasis on themes as well as form in the works of authors Joan Didion, Kurt Vonnegut, Ken Kesey, R. D. Laing, Harold Pinter, Anne Sexton, Gary Snyder, Robert Lowell, James Wright, among others. *Brookhouse, 15.*

Poulin, *Contemporary American Poetry* (1971), $6.95
Pinter, *The Lover, Tea Party, the Basement, Two Plays and a film script* (1967), $2.95
Laing, *The Politics of Experience* (1967), $.95
Didion, *Slouching Towards Bethlehem* (1962), $1.95
Kesey, *One Flew Over the Cuckoo's Nest* (1962), $1.25
Vonnegut, *Slaughterhouse-Five* (1969), $1.95
MacDonald, *The Goodbye Look* (1969), $.95

Eng. 32
UNC-CH

BUSINESS ENGLISH (3 s.h.). The vocabulary, forms, and literature of the business profession are studied with special attention to letters of application and inquiry; routine, collection, adjustment, and sales letters; business reports; and technical articles. Specimen letters are criticized and actual business problems solved through written work. *Shea, 23.*

Menning and Wilkinson, *Communicating Through Letters and Reports*, 5th ed. (1972), $13.50
Lesikar, *Report Writing for Business* (1969), 3rd ed. $9.75

Eng. 32a
UNC-CH

BUSINESS ENGLISH (2 s.h.). This course is similar to English 32. Students should not take both courses. *Shea, 16.*

Menning and Wilkinson, *Communicating Through Letters and Reports*, 5th ed. (1972), $13.50

Eng. 321
NCSU

THE COMMUNICATION OF TECHNICAL INFORMATION (3 s.h.). Intensive training in the fundamentals of business and industrial expository and persuasive writing, with

emphasis on the most effective ways of presenting information in clear, forthright, and efficient writing, and in a fitting and logical structure. Attention is given to the basic conventions of punctuation, grammar, and usage; to the development of sentence style and structure; to methods of developing good paragraphs; to organization of reports and other business documents, and to business correspondence. *Dandridge, 20.*

Pickett, *Writing and Reading in Technical English* (1970), $9.50

Eng. 34F UNC-CH CREATIVE WRITING: THE SHORT STORY (3 s.h.). Students are introduced to the practice of basic fiction techniques and write numerous short papers as well as three full stories, one of which will be revised as a final examination. Literary stories by well known writers are read and analyzed. Each student is required to keep a journal for which supplementary assignments are made. Emphasis is on individual creative work and a tutorial relationship with the instructor. NOTE: Due to the creative nature of the work in this course, both on the part of the student and the instructor, students are advised not to take it under duress of receiving credit by a specific deadline. *Rabb, 20.*

Dietrich & Sundell, *The Art of Fiction*, 2nd ed. (1974), $6.95

***Eng. 35 UNC-CH** CREATIVE WRITING: THE SHORT STORY (Advanced) (3 s.h.). This course seeks to discover and develop students' creative writing abilities in the planning and preparing of short stories. There are no set assignments, but students accomplish the equivalent of three semester hours' work by writing five or six stories. NOTE: Due to the creative nature of the work in this course, both on the part of the student and the instructor, students are advised not to take it under duress of receiving credit by a specific deadline. *Eaton*, **prerequisite: English 34F or equivalent.**

***Eng. 35P UNC-CH** CREATIVE WRITING: POETRY (3 s.h.). Advanced poetry writing. There are no set assignments, but the student accomplishes the equivalent of three semester hours' work in a tutorial relationship with the instructor. NOTE: Due to the creative nature of the work in this course, both on the part of the student and the instructor, students are advised not to take it under duress of receiving credit by a specific deadline. *Eaton*, **prerequisite: an introductory course in poetry writing or permission of the instructor.**

Eng. 36 UNC-CH MODERN ENGLISH GRAMMAR (3 s.h.). An introductory course in English linguistics. Topics include the phonology (the sound system), morphology (structure of words), and syntax (how words are combined into sentences) of current American English. The course also clarifies misconceptions about dialect, "correct" usage, the relationship between languages, and the relation of sound to writing. *Crowley, 15.*

Bolinger, *Aspects of Language* (1968), $6.95
Alyeshmerni and Taubr, *Working with Aspects of Language* (1970), $5.50

Eng. 43 UNC-CH THE ENGLISH NOVEL (3 s.h.). The development of the English novel, particularly in the eighteenth and nineteenth centuries, is studied. Works by Fielding, Smollett, Jane Austen, Scott, Dickens, Thackeray, and George Eliot receive special attention. *Barnes, 25.*

Wagenknecht, *Cavalcade of the English Novel* (1954), $6.00 (used)
Fielding, *Tom Jones*, paperback, $2.00
Smollett, *Humphry Clinker*, paperback, $2.95
Austen, *Pride and Prejudice*, paperback, $.50, hardback, $2.95
Scott, *The Heart of Midlothian*, paperback, $1.95
Thackeray, *Vanity Fair*, paperback, $1.25 (hardback, $1.95)
Eliot, *Adam Bede*, paperback, $.75
Dickens, *Little Dorrit*, $4.00

**NOTE: Applicants for English 35 or 35P who are not working for degree credit should send to Independent Study, for the instructor's consideration, a sample manuscript of their work and a fee of $3.00. They will be advised to enroll for English 34F, or English 35, or English 35P on the basis of the manuscript.*

Eng. 58
UNC-CH

SHAKESPEARE (3 s.h.). About twenty of Shakespeare's representative comedies, tragedies, and histories will be studied. *Mills, 25.*

Neilson and Hill, *The Complete Plays and Poems of William Shakespeare*, New Cambridge ed. (1942), $13.50
Ribner, *William Shakespeare* (1969), $3.95

Eng. 81
UNC-CH

AMERICAN LITERATURE: BEGINNINGS TO 1865 (3 s.h.). This survey course begins with a brief examination of selected works of such figures as Edward Taylor, Benjamin Franklin, and Jonathan Edwards, but the major focus of the course falls upon Emerson, Thoreau, Poe, Hawthorne, and Melville. *Bain, 25.*

Bradley, Beatty, and Long, *The American Tradition in Literature*, Vol. I, 3rd ed. (1967), $6.95
Holman, *A Handbook to Literature*, Based on the original by Thrall and Hibbard, 3rd ed. (1972), $3.90

Eng. 95
UNC-CH

ENGLISH AND AMERICAN DRAMA OF THE TWENTIETH CENTURY (3 s.h.). Modern American and English drama with emphasis on works since the 1920's and such playwrights as O'Neill, Odets, Albee, and Pinter. *Avery, 24.*

Anderson, *Four Verse Plays* (1959), $3.95
Clurman, ed., *Famous American Plays of the 1930's* (1959), $.95
Kernan, *Classics of the Modern Theater* (1965), $5.95
Macgowan, *Famous American Plays of the 1920's* (1959), $.95
Rice, *Three Plays* (1965), $2.25
Shaw, *Plays* (1960), $1.25
Pinter, *The Homecoming* (1966), $1.95
Strindberg, *Seven Plays* (1960), $1.25
Warnock, *Representative Modern Plays, American* (1952), $5.95
Weiss, *Marat/Sade* (1965), $3.95

ENVIRONMENTAL HEALTH

EHLT 220
ECU

WATER SUPPLIES AND WASTE WATER TREATMENT (4 q.h., equivalent to 2 2/3 s.h.). Water and waste water treatment, municipal, semi-private and individual systems, with a review of sources, chemical and bacteriological quality, and water pollution. **Students taking this course by independent study will be expected, with the assistance of the instructor or Independent Study, to make arrangements to work with designated laboratories and health departments in their areas to complete the necessary laboratory exercises and field observations. Note: This course was in preparation at the time the catalog went to press; please inquire before enrolling.** *Kane, prerequisites: BIOL 110, CHEM 34, 35, 36, or departmental permission;* **prerequisites will be waived for non-credit students.**

GEOGRAPHY

Geog. 38
UNC-CH

PHYSICAL GEOGRAPHY (3 s.h.). A study of the major elements of man's physical environment. The nature, origin and distribution of the world's climates, soils, vegetation and landforms are considered, and interrelationships between them noted. Particular attention is given to the environment of North America. *Robinson, 22.*

Strahler, *Introduction to Physical Geography*, 3rd ed. (1973), $12.95
Hare, *The Restless Atmosphere* (1963), $1.95
Upon request: *Man's Domain: A Thematic Atlas of the World* (1970), $4.95

GY 208
NCSU

ENVIRONMENTAL PHYSICAL GEOGRAPHY (3 s.h.). Study of the physical conditions on the earth's surface that influence human activities; factors of man's environment, including planetary conditions, geography location, climate and weather, soils and land forms. *Welby, 15.*

Trewartha, *Fundamentals of Physical Geography*, 2nd ed. (1968), $12.95

Geog. 157
UNC-CH

GEOGRAPHY OF ANGLO-AMERICA (3 s.h.). Topical and regional geography of America north of the Rio Grande, including elements of the physical, economic, and cultural landscape. The course begins with an examination of several topical subjects including map interpretation and the physiography and climate of Anglo-America. Thereafter, Anglo-America is divided into regions that are examined separately. After all the regions have been covered, the last several assignments return to topical theme. *Florin, 23.*

White, Foscue, and McKnight, *Regional Geography of Anglo-America*, 3rd ed. (1964), $13.50
Oxford Regional Economic Atlas of the U.S. and Canada, $7.95
Maps, $.48

GEOLOGY

Geol. 11
UNC-CH

PHYSICAL GEOLOGY (4 s.h.). The nature and origin of minerals and rocks, volcanoes, earthquakes, earth's interior, mountains, soil, groundwater, landscapes and the geologic work of glaciers, streams and wind are covered in this course. The topics of continental drift and the relationship between geology and man's environment also are considered. *Feiss, 20.*

Jackson, *Geology Today* (1973), $14.50
Committee on Geological Sciences, National Research Council-National Academy of Sciences, *The Earth and Human Affairs* (1972), $2.95
Zumberge, *Laboratory Manual for Physical Geology*, 4th ed. (1973), $6.95
Rock and mineral set, $8.35
New Bloomfield Quadrangle, Pennsylvania topographic map, 15 minute series (1952), $.95

GY 101
NCSU

EARTH SCIENCE (3 s.h.). Introductory course in general geology; changes in the earth, and underlying physical and life processes. (Not to be taken after GY 120.) *Welby, 18.*

Part I
Foster, *Geology* (1971), $3.95
Gross, *Oceanography*, 2nd ed. (1971), $3.95
Miller, *Meteorology*, 2nd ed. (1971). $3.95

**Part II
Set A
Bloom, *Surface of the Earth* (1969), $3.25
Turner, *Applied Earth Science* (1969), $2.95

Set B
Mehlin, *Astronomy & Origin of the Earth* (1968), $1.95
McAlester, *The History of Life* (1968), $3.25

Set C
Clark, *Fossils, Paleontology, and Evolution* (1968), $1.95
Eicher, *Geologic Time* (1968), $2.95

Set D
Mehlin, *Astronomy & Origin of the Earth* (1968), $1.95
Bloom, *Surface of the Earth* (1969), $3.25

**You may choose which set from Part II to complete. If you prefer, you may wait until you receive your study guide before ordering the materials for Part II. Only one set will be required.

GERMANIC LANGUAGES

Germ. 1
UNC-CH

ELEMENTARY GERMAN (3 s.h.). In German 1 and 2 the student will acquire some elementary communications skills and get a systematic introduction to the basic grammatical patterns of the German language. While reading and writing will get the major emphasis, tape recordings will make it possible to also practice listening and speaking. This use of all four basic skills enables the student to approach the new language from every possible angle and thus to lay the foundation for future reading or conversation courses. Cassettes are required, and the student must have access to cassette tape player. *Jacoby, 26.*

Feld, *et al.*, *Anfang und Fortschritt*, 2nd ed. (1973), $9.95
Laboratory Workbook for Anfang und Fortschritt (1973), $3.20
Ten cassette tapes, $7.50

Germ. 2
UNC-CH

ELEMENTARY GERMAN (3 s.h.). A continuation of German 1 and an introduction to simple literary readings. *Jacoby, 27,* **prerequisite: German 1 or equivalent.**

Feld, *et al.*, *Anfang und Fortschritt*, 2nd ed. (1973), $9.95
Laboratory Workbook for Anfang und Fortschritt (1973), $3.20
Rechtschaffen, *et al.*, *Literatur fuer den Deutschunterricht, Zweite Stufe* (1964), $2.50
Eight cassette tapes, $6.00

Germ. 3
UNC-CH

INTERMEDIATE GERMAN (3 s.h.). Designed to develop speed and accuracy in reading German and to acquaint the student with some of Germany's outstanding prose writers, German 3 entails, in addition to the reading, a thorough grammar review. *Jacoby, 25,* **prerequisite: German 2 or equivalent.**

Roeseler, *German in Review*, 3rd ed. (1961), $4.60
Hesse, *Knulp* (1932), $2.25
Fleissner, *Deutches Literatur-Lesebuch*, 3rd ed. (1959), $3.20

Germ. 4
UNC-CH

INTERMEDIATE GERMAN (3 s.h.). German 4 includes work by Eichendorff, Hesse, and Mann, and introduces an easier work by Kaestner for sight reading. *Jacoby, 25,* **prerequisite: German 3 or equivalent.**

Eichendorff, ed. Schwarz, *Aus dem Leben eines Taugenichts* (1969), $3.75
Mann, ed. Kelly, *Tonio Kroeger* (1959), $2.95
Hesse, ed. Peebles, *Drei Erzaehlungen* (1950), rent, $1.00 for 3 months
Kaestner, *Emil und die Detektive*, Rev. ed. (1945), $4.65

Germ. 21
UNC-CH

GERMAN LITERATURE (3 s.h.). This introductory course in modern German literature (1870-1950) serves both to further reading aptitude and to acquaint the student with eminent authors of this period. *Jacoby, 25,* **prerequisite: German 4 or equivalent.**

Feise and Steinhauer, *German Literature Since Goethe, Part Two: An Age of Crisis, 1870-1950* (1958), $6.95
Feise and Steinhauer, *General Vocabulary to German Literature Since Goethe,* $1.60

HISTORY

Hist. 11
UNC-CH

WESTERN CIVILIZATION FROM EARLIEST TIMES TO THE MID-SEVENTEENTH CENTURY (3 s.h.). A study of the political, economic, cultural, and religious institutions and ideas of the western world from their origin to early modern times. *Maner, 9.*

Cantor, *Western Civilization: Its Genesis and Destiny*, Vol. I (1969), $13.25
Hollister, ed. *Landmarks of the Western Heritage*, Vol. I: The Ancient Near East to 1789, 2nd ed. (1973), $7.95
Schaefer, Resnick and Netterville, eds., *The Shaping of Western Civilization*, Vol. I, The Traditonal World (1970), $10.95
Elton, ed., *Renaissance and Reformation, 1300-1648* (1963), $4.25

HI 204
NCSU

WESTERN CIVILIZATION TO 1400 (3 s.h.). A survey of Western Civilization from earliest times to the end of the medieval era, treating the major civilizations which contributed to the development of Western Civilization until the end of the medieval period. *Nixon, 17.*

Brinton, *History of Civilization, Prehistory to 1715*, Vol. I. (1971), $12.95
Lerner, *Student's Guide to History of Civilization*, Vol. I (1968), $2.95

Hist. 12
UNC-CH

WESTERN CIVILIZATION FROM THE MID-SEVENTEENTH CENTURY TO THE PRESENT TIME (3 s.h.). The development and spread of western civilization since about 1650. A study of the ideas, institutions, and developments that have created the modern world. *Maner, 10.*

Cantor, *Western Civilization: Its Genesis and Destiny*, Vol. II: 1300-1815 (1970), $6.50
Cantor, *Western Civilization: Its Genesis and Destiny*, Vol. III: 1815-Present (1970), $6.50
Schaefer, Resnick, and Netterville, ed., *The Shaping of Western Civilization*, Vol. II: The Modern World (1970), $7.25
Schrier, *Modern European Civilization* (1963), $7.95

HI 205
NCSU

WESTERN CIVILIZATION SINCE 1400 (3 s.h.). An introductory survey of the development of Western Civilization during the modern period from the Renaissance to the present. *Nixon, 21.*

Brinton, *History of Civilization, Prehistory to 1715*, Vol. I, (1971), $12.95
Brinton, *History of Civilization, 1715 to Present*, Vol. II (1971), $12.95
Rice, *Student's Guide to History of Civilization*, Vol. II (1970), $2.95

Hist. 21
UNC-CH

AMERICAN HISTORY, 1607-1877 (3 s.h.). This course is a general survey of the history of the United States from the settlement of America to the emergence of the United States as an industrial nation. The emphasis throughout is on making relationships between important facts and drawing conclusions from them. *Williams, 16.*

Blum, *et al., The National Experience, A History of the United States to 1877, Part One*, 3rd ed. (1973), $8.50
Demos, *A Little Commonwealth: A Family History of Life in Plymouth Colony* (1970), $2.50
Franklin, *Autobiography* (1955), $.95
Grimsted, ed., *The Notions of the Americans, 1820-1860* (1970), $4.95
Lerner, *The Grimke Sisters of South Carolina: Pioneers for Women's Rights and Abolition* (1967), $3.95

Hist. 22
UNC-CH

AMERICAN HISTORY, 1865-1972 (3 s.h.). This course is a general survey of the history of the United States from the end of the Civil War to the present. Particular emphasis is placed upon politics, economics, and the significant legislation of the period. *Williams, 22.*

Blum, *et al., The National Experience, A History of the United States Since 1865, Part Two*, 3rd ed. (1973), $8.50
Hicks, *The Populist Revolt.* (1961), $2.75
Leuchtenburg, *The Perils of Prosperity.* (1958), $3.95
Conkin, *The New Deal*, 2nd ed. (1975), $3.75

HI 243
NCSU

UNITED STATES 1845-1914 (3 s.h.). The coming of the Civil War; the war and the reconstruction of the nation; the rise of industrialism and the Populist and Progressive response; the emergence of the United States as a world power. *Beezley, 15.*

Cords, *Myth & the American Experience*, Vol. II (1973), $6.95
Hofstadter, *The American Republic*, Vol. II, 2nd ed. (1970), $12.95
Nichols, *The Stakes of Power, 1845-1877* (1961), $2.95

Hist. 31
UNC-CH

RUSSIA AND THE SOVIET UNION FROM 1861 TO THE PRESENT (3 s.h.). This course enables the student to obtain some insight into the political and cultural trends which underlie the development of Russian state and society and their positions in the modern world. No more than 4 assignments per week may be submitted in this course. *Brooks, 15.*

Riasanovsky, *A History of Russia*, 2nd ed. (1969), $11.95
Adams, ed., *Imperial Russia after 1861* (1965), $2.95
Shub, *Lenin* (abridged edition), (1948), $.95
Daniels, *The Stalin Revolution* (1972), $2.95
Deutscher, *The Unfinished Revolution* (1967), $1.95

Hist. 41
UNC-CH

ANCIENT HISTORY (3 s.h.). Dealing with the history of the Orient, Greece, and Rome to the time of Constantine, this course pays particular attention to social and economic conditions, and cultural and religious developments. *McCoy, 24.*

Roebuck, *The World of Ancient Times* (1966), $6.95

HI 207
NCSU

THE ANCIENT WORLD TO 180 A.D. (3 s.h.). A study of the ancient cultures of the Middle East and Graeco-Roman civilization. Includes study of Egyptian, Minoan, Mycenean, Greek, and Roman societies and cultures. *Sack, 15.*

Bailkey, *Readings in Ancient History* (1969), $6.95
Jones, *Ancient Civilization* (1960), $12.95 (new), $9.00 (used)

Hist. 44
UNC-CH

ENGLISH HISTORY (3 s.h.). A survey of English history from the earliest times to 1714, this course includes the Anglo-Saxon period, the Norman conquest, the feudal period, the Tudor monarchy, the constitutional struggles of the seventeenth century, and the end of the Stuart monarchy. *Godfrey, 25.*

Smith, *A History Of England*, 3rd ed. (1966), $10.95

Hist. 45
UNC-CH

ENGLISH HISTORY (3 s.h.). This course begins with 1715 and comes to the present. It deals with the Hanoverians, the American Revolution, the Napoleonic era, the Industrial Revolution, and the great social and economic changes of the nineteenth and twentieth centuries as England changed from a laissez-faire economy to a welfare state. *Godfrey, 25.*
Smith, *A History of England*, 3rd ed. (1966), $10.95
Trevelyan, *History of England*, Vol. III (1953), $2.50

Hist. 46
UNC-CH

LATIN AMERICAN HISTORY: COLONIAL AND REVOLUTIONARY PERIODS (3 s.h.). History 46 surveys the development of Latin America from its pre-Columbian Indian civilizations to the establishment of independent governments in most of the region during the first quarter of the nineteenth century. As well as the political institutions and organizations, the economic, social, and cultural progress is studied. *Seckinger, 24.*

Fagg, *Latin America: A General History* (1969), $11.95
Padden, *The Hummingbird and the Hawk* (1967), $1.95
Pike, ed., *The Conflict Between Church and State in Latin America* (1964), $2.95
Whitaker, ed., *Latin America and the Enlightenment* (1961), $1.75
Maps, $.40

Hist. 47
UNC-CH

LATIN AMERICAN HISTORY: NATIONAL PERIOD (3 s.h.). A survey of the development of civilization in Latin America from the establishment of its independence from European powers to the present, this course deals not only with the internal history of the Latin American nations, but also with their relations with one another and with the role of that region in the world. By exploring the major trends and movements in the political, cultural, social, and economic life of the area, the course enables the student to make meaningful interpretations of Latin America's past. *Seckinger, 24.*

Fagg, *Latin America: A General History* (1969), $11.95
Bierck, ed., *Latin American Civilization: Readings and Essays* (1967), $4.95

HI 216
NCSU

LATIN AMERICA SINCE 1826 (3 s.h.). A survey of social, economic, political and intellectual life in the 19th and 20th centuries. Major attention is given to Mexico, Argentina, Brazil, Peru and Cuba. Topics include the social structure of the new nations; 19th century liberalism; the force of tradition; relations with Europe and the United States; the Monroe Doctrine and U.S. intervention; economic change; caudillo rule; 20th century upheavals; the Mexican Revolution; Peron's Argentina; Castro and Latin America. *Beezley, 14.*

Hanke, *History of Latin America*, Vol. II (1967), $5.20 (used)
Herring, *A History of Latin America*, 3rd ed. (1968), $10.95
Lockwood, *Castro's Cuba, Cuba's Fidel* (1969), $2.95

Hist. 48
UNC-CH

MODERN EUROPEAN HISTORY, 1500-1815 (3 s.h.). History 48 comprises an introductory survey of the history of Europe from about 1450 to 1815. *Godfrey, 24.*

Lee, *Base Map for European History* (1937), $.20
Clough, *et al., Early Modern Times*, Vol. II (1964), $6.50
Palmer, *Historical Atlas of the World*, $1.00
Rowen, *From Absolutism to Revolution, 1648-1848* (1963), $4.50
Elton, ed., *Renaissance and Reformation: 1300-1648* (1968), $4.25

Hist. 49
UNC-CH

MODERN EUROPEAN HISTORY SINCE 1815 (3 s.h.). History 49 is an introductory course in the history of Europe since 1815. *Godfrey, 24.*

Clough, *et al., A History of the Western World: Modern Times*, Vol. III, 2nd ed., (1969), $6.50
Palmer, *Historical Atlas of the World*, $1.00
Weber, ed., *The Western Tradition: From the Enlightenment to the Atomic Age*, 2nd ed. (1965), $4.95

Hist. 143
UNC-CH

THE DIPLOMATIC HISTORY OF THE UNITED STATES, 1776-1914 (3 s.h.). The course traces the development of American foreign relations from the Revolution to the outbreak of the First World War with an eye to understanding the role of the United States in its world setting. The student should gain an appreciation of the forces determining American diplomacy, the complex nature of decision-making, and the shifting responsibilities of the American government. *Kilgroe, 21,* **prerequisite: at least one semester of a college-level survey course in American history.**

DeConde, *A History of American Foreign Policy* (1971), $8.95
Williams, *The Shaping of American Diplomacy*, Vol. I: 1750-1914 (1970), $6.25
LaFeber, *John Quincy Adams and American Continental Empire* (1965), $2.25
Beale, *Theodore Roosevelt and the Rise of America to Power* (1956), $1.50

Hist. 144
UNC-CH

DIPLOMATIC HISTORY OF THE UNITED STATES, 1914 TO THE PRESENT (3 s.h.). The course traces the development of American foreign relations from 1914 to the present with an eye to understanding the role of the United States in its world setting. It is hoped that the course will provide students with an understanding of the forces shaping twentieth-century diplomacy, the complex nature of decision-making, and the historical background of present-day problems. *Kilgroe, 19,* **prerequisite: a college level survey course in American history; it is also preferable that the student have completed History 143.**

DeConde, *A History of American Foreign Policy* (1971), $8.95
Williams, *The Shaping of American Diplomacy*, Vol. II: 1914-1968 (1970), $6.25
Link, *Wilson the Diplomat* (1957), $2.25
LaFeber, *America, Russia, and the Cold War, 1945-1966* (1967), $3.95

Hist. 161
UNC-CH

NORTH CAROLINA, 1548-1835 (3 s.h.). This course surveys the political, social, economic, and cultural development of North Carolina from the first settlement until 1835. *Martin, 25.*

Lefler and Newsome, *North Carolina: The History of a Southern State* (1973), $10.00
Lefler, *North Carolina History Told by Contemporaries,* 4th ed. (1965), $9.95

Hist. 162 UNC-CH NORTH CAROLINA, 1835-1973 (3 s.h.). History 162 consists of a survey of political, economic, social and cultural development in North Carolina since 1835. It is recommended that students take Hist. 161 before taking Hist. 162. *Martin, 25.*

Same texts as for History 161

ITALIAN

Ital. 1 UNC-CH ELEMENTARY ITALIAN (3 s.h.). This course aims at a thorough knowledge of the basic grammatical patterns so that the student may not only acquire a good level of proficiency in Italian conversation, but also grasp the general principles governing the structure of the language. Student must have access to a tape recorder: some assignments must be submitted on tape. *Archiapatti, 24.*

Hall and Bartoli, *Basic Conversational Italian* (1963), $12.95
Cassette tapes: $2.00

Ital. 2 UNC-CH ELEMENTARY ITALIAN (3 s.h.). Reading and writing skills are developed and the student is guided toward further mastery of the fundamentals of the Italian language. *Archiapatti, 24,* **prerequisite: Italian 1 or equivalent.**

Hall and Bartoli, *Basic Conversational Italian* (1963), $12.95
Speroni and Golino, *Panorama Italiano* (1960), $5.20
Cassette tapes: $1.00

Ital. 3 UNC-CH INTERMEDIATE ITALIAN (3 s.h.). The Italian language is studied with emphasis on reading and writing. *Archiapatti, 24,* **prerequisite: Italian 2 or equivalent.**

Young and Cantarella, *Corso d'Italiano* (1942), $6.95
Marraro, *Scrittori Italiani Moderni* (1960), $3.50

Ital. 4 UNC-CH INTERMEDIATE ITALIAN (3 s.h.). A thorough knowledge of the Italian language is gained through reading a varied spectrum of Italian contemporary prose and writing in Italian on a variety of given topics. *Archiapatti, 24,* **prerequisite: Italian 3 or equivalent.**

Young and Cantarella, *Corso d'Italiano* (1942), $6.95
Olken and Musa, *Strada Facendo* (1966), $7.50
Olken, ed., *Racconti del Novencento: Forti e deboli* (1966), $3.25

LATIN

Lat. 1 UNC-CH ELEMENTARY LATIN (3 s.h.). The principles of Latin necessary for the translation of Latin into English are introduced. A pronunciation record is required. *Solomon, 24.*

Ullman, Henderson, and Henry, *Latin for Americans, First Book* (1962), $9.36
Recording (33 1/3 r.p.m.) $2.50

Lat. 2 UNC-CH ELEMENTARY LATIN (3 s.h.). Development of the ability to read and translate Latin prose is the primary aim of this course. Two books of Caesar's *Gallic Wars* will be read. *Solomon, 24,* **prerequisite: Latin 1 or equivalent.**

Ullman, Henderson, and Henry, *Latin for Americans, Second Book* (1962), $9.68

Lat. 3 UNC-CH INTERMEDIATE LATIN (3 s.h.). In translating Cicero's *First Oration against Cataline and In Defense of Archias,* attention is given to vocabulary, grammatical forms and syntax, and to the basic stylistic devices of Cicero's prose. *Solomon, 24,* **prerequisite: two years of high school Latin, or two semesters of college Latin.**

Ullman and Suskin, eds., *Latin for Americans, Third Book* (1965), $6.04
Bennett, *New Latin Grammar* (1918), $4.04
Cowell, *Cicero and the Roman Republic* (1973), $1.95

Lat. 4
UNC-CH

INTERMEDIATE LATIN (3 s.h.). This course has a dual purpose: to polish the student's ability to translate Latin prose and to introduce him to Latin poetry. The work includes careful translation of selected lines and verses, an introduction to the scansion of Latin heroic poetry and a thorough review of Latin forms and syntax, an analysis of certain creative techniques encountered in Ovid and Livy, and a thoughtful, comprehensive review of Laistner's *The Greater Roman Historians. Solomon, 24,* **prerequisite: Latin 3 or equivalent.**

Gould and Whiteley, *Livy, Book I* (1952), $2.50
Gould and Whiteley, *Ovid: Metamorphoses*, Book VIII (1940), $2.00
Bennett, *New Latin Grammar* (1918), $4.04
Laistner, *The Greater Roman Historians* (1947), $2.25
De Selincourt, *Livy: The Early History of Rome* (1960), $2.45

Lat. 21
UNC-CH

SELECTIONS FROM LATIN POETRY (3 s.h.). The primary purpose of the course is to perfect the student's ability to translate and scan Latin epic poetry. A strong secondary emphasis is placed on literary appreciation. *Solomon, 24,* **prerequisite: four years of high school Latin, or two years of college Latin.**

Gould & Whiteley, *P. Vergilius Maro, Aeneid, Book Eight* (1965), $1.65
Gould & Whiteley, *P. Vergilius Maro, Aeneid, Book 12* (1962), $1.50
Humphries, *The Aeneid of Virgil* (1951), $2.95
Mackail, *Virgil and His Meaning to the World of Today* (1963), $3.95
Bennett, *New Latin Grammar* (1918), $4.04

Lat. 22
UNC-CH

LATIN POETRY (3 s.h.). Emphasis is put on content, literary form and appreciation and versification while reading about two-thirds of the poems of Catullus. *Solomon, 24,* **prerequisite: four years of high school Latin or two years of college Latin.**

Merrill, ed., *Catullus* (1951), $4.00
Bennett, *New Latin Grammar* (1918), $4.04
Wheeler, *Catullus and the Traditions of Ancient Poetry* (1964), $1.95
Upon request: *Lewis, An Elementary Latin Dictionary* (1918), $12.00

MATHEMATICS

Math. A
UNC-CH

PLANE GEOMETRY (non-credit). A course designed to enable the student to acquire thorough knowledge of the facts of plane geometry needed for continued work in mathematics and allied subjects. This course will be accepted by the University to remove a deficiency in plane geometry for admission. The material covered, if taken in high school, would require one full school year, being equivalent to one unit. *Henry, 24. Fee, $73.00*

Moise and Downs, *Geometry* (1967), $8.88

Math. R
UNC-CH

CONTEMPORARY ALGEBRA (non-credit). A contemporary approach to the algebra of real and complex numbers, this is the equivalent of what was formerly called Intermediate Algebra. The manner in which the subject is treated is in line with the new approach now being introduced into the schools at both the elementary and secondary levels. *Henry, 27. Fee, $73.00*

Heimer, Kocher, Lottes, *A Program in Contemporary Algebra* (1972), Series of five books, $27.00

Math. 30
UNC-CH

ELEMENTARY FUNCTIONS AND COORDINATE GEOMETRY (3 s.h.). Real and complex numbers, inequalities, functions and their graphs, operations on functions, polynomials, rational and algebraic functions, exponential and logarithmic functions, trigonometric functions, and elementary analytic geometry are covered. *Henry, 24.*

Fisher and Zeibur, *Integrated Algebra and Trigonometry with Analytic Geometry*, 3rd ed. (1972), $13.50

MA 111 NCSU

ALGEBRA AND TRIGONOMETRY (4 s.h.). Sets and logic, the real number system, polynomials, algebraic fractions, exponents and radicals, linear and quadratic equations, inequalities, functions and relations, logarithms, plane trigonometry. *Savage, 20.*

Robison, *Modern Algebra & Trigonometry*, 2nd ed. (1973), $12.95

Math. 31 UNC-CH

CALCULUS WITH ANALYTIC GEOMETRY (3 s.h.). An integrated treatment of analytic geometry and the differential and integral calculus of functions of one variable. Differential equations. NOTE: It is suggested that students planning to take Math 32 do both Math 31 and 32 by correspondence or do both courses on campus. *Graves, 20,* **prerequisite: Mathematics 30.**

Merriell, *Calculus, A Programmed Text, Volume I, Techniques and Applications* (1974), $8.95

MA 102 NCSU

ANALYTIC GEOMETRY AND CALCULUS 1 (4 s.h.). The first of three semesters of a unified course in analytic geometry and calculus. Topics include rectangular coordinates in the plane, graphs and equations of lines, algebraic curves, including the conic sections and others examined by general discussion methods. Also introduced are functions, limits, continuity differentiation of algebraic functions, with applications of derivatives and differentials. *Savage, 20,* **prerequisite: MA 111 or equivalent completed in high school. Credit in both MA 102 and MA 112 is not allowed for N.C. State students.**

Purcell, *Calculus with Analytic Geometry*, 2nd ed. (1972), $15.50

Math. 32 UNC-CH

CALCULUS WITH ANALYTIC GEOMETRY (3 s.h.). See description for Mathematics 31. *Graves, 24,* **prerequisite: Mathematics 31.**

Merriell, *Calculus, A Programmed Text, Volume II, Theory* (1974), $5.50

NOTE: STUDENTS WHO TOOK MATHEMATICS 31 USING THE LANG TEXTBOOK SHOULD ENROLL IN MATHEMATICS 32 USING THE FOLLOWING TEXTBOOK:

Lang, *A First Course in Calculus*, 3rd ed. (1968), $11.95

MA 201 NCSU

ANALYTIC GEOMETRY AND CALCULUS II (4 s.h.). The second of three semesters of a unified course in analytic geometry and calculus. Applications of the definite integral. Other topics include: methods of integration, polar coordinates, and infinite series. *Savage, 20,* **prerequisite: MA 102.**

Purcell, *Calculus with Analytic Geometry*, 2nd ed. (1972), $15.50

MA 202 NCSU

ANALYTIC GEOMETRY AND CALCULUS III (4 s.h.). The third of three semesters of a unified course in analytic geometry and calculus. Brief introduction to determinants and matrices, vector functions, analytic geometry of three dimensions and partial differentiation, multiple integration, applications. Line integral and Green's Theorem, *Savage, 30,* **prerequisite: MA 201.**

Thomas, *Calculus & Analytic Geometry* (1968), $15.95

MA 122 NCSU

MATHEMATICS OF FINANCE (3 s.h.). Single and compound interest, annuities and their application to amortization and sinking fund problems, installment buying, and calculation of premiums of life annuities and life insurance. **Students in this course will be required to return graded assignments to the Independent Study office before taking the final examination.** *Lewis, 17,* **prerequisite: MA 111 or its equivalent in high school, or MA 114, or MA 115 or MA 116.**

Hart, *Mathematics of Investment*, 4th ed. (1958), $8.25 (used)

For the final examination, students will be required to have a handbook of tables

suitable for the mathematics of finance. Kent and Kent, *Compound Interest and Annuity Tables* (1926), $2.95, is available from Independent Study.

MUSIC

Mus. 14
UNC-CH

HARMONY (3 s.h.). Music 14 deals with major and minor scales, their primary triads in root positions as well as in inversions, accented and unaccented passing notes, auxiliary notes, six-four and dominant seventh chords, diminished and augmented triads. *Igoe, 24*, **prerequisite: Music 21 or equivalent.**

Kitson, *Elementary Harmony*, Part I (1969), $3.00
Upon request: Staff paper, $.45

Mus. 15
UNC-CH

HARMONY (3 s.h.). The secondary or diatonic chords of the seventh and their particular uses are studied. Changing notes, anticipations, and chromatic passing notes are added to the vocabulary, and elementary modulation is brought in to enrich the scope of melodic expression. Suspensions with their rich dissonances add to the general interest. *Igoe, 25*, **prerequisite: Music 14 or equivalent.**

Kitson, *Elementary Harmony*, Part I (1969), $3.00
Kitson, *Elementary Harmony*, Part II (1963), $3.00
Upon request: Staff paper, $.45

Mus. 21
UNC-CH

FUNDAMENTALS OF MUSIC (3 s.h.). This course is directed primarily at the student with little or no formal background in music. Musical notation, the organization of both major and minor scales, key and time signatures, rhythms, melody-writing, simple keyboard chord progressions, sight-singing, and lyrics are studied. *Igoe, 15.*

A musical recorder (instrument), $5.00
3 or 4 blank cassette tapes
Access to a cassette tape recorder for both recording and playing back
Access to a keyboard instrument, preferably a piano
Staff paper, $.45

(An examination fee of $5.00 will be charged at UNC for use of the facilities and equipment in the Music Department. Other schools may charge a different fee. The student assumes responsibility for fee and arrangements for the examination. Examination arrangements should be made well in advance of the date the exam is to be taken.)

Mus. 41
UNC-CH

MUSIC APPRECIATION (3 s.h.). An introduction to music through an exploration of elements, styles, and forms, with a consideration of selected masterworks presented on phonographic recordings. This course seeks to lay a foundation for the comprehension and enjoyment of music of any period or genre. *Tuttle, 20.*

Machlis, *The Enjoyment of Music*, 3rd ed. (1970), $8.95
Recordings for *The Enjoyment of Music and The Norton Scores* (Norton), $14.95

PHILOSOPHY

Phil. 20
UNC-CH

INTRODUCTION TO PHILOSOPHY (3 s.h.).This course covers three philosophical problems in detail: the problem of knowledge and skepticism, the problem of freedom and determinism, and the mind-body problem. *Waller, 15.*

Cornman, *Philosophical Problems and Arguments: An Introduction* (1974), $12.95

PHI 205
NCSU

PROBLEMS AND TYPES OF PHILOSOPHY (3 s.h.). An introduction to the basic philosophical issues which arise in the consideration of the nature and validity of knowledge, human nature, freedom and determinism, aesthetics, ethics, religion, and science; and to the major types of philosophical outlooks: naturalism, idealism, pragmatism, existentialism, and analytic philosophy. *Fitzgerald, 15.*

Titus and Smith, *Living Issues in Philosophy*, 6th ed. (1974), $10.95
Titus, Hepp and Smith, *The Range of Philosophy*, 3rd ed. (1975), $6.50

Phil. 21
UNC-CH

INTRODUCTORY SYMBOLIC LOGIC. (3 s.h.). This course treats the standard notations, methods, and principles of symbolic logic as used to determine the validity and invalidity of arguments. Only the simplest formal systems of symbolic logic are covered: truth-function theory and one-variable quantification theory. *Goble, 18.*

Resnik, *Elementary Logic* (1970), $11.95

POLITICAL SCIENCE

Pol. Sci. 41
UNC-CH

INTRODUCTION TO GOVERNMENT IN THE UNITED STATES (3 s.h.). An introduction to American government, primarily on the national level, this course is intended to provide a "realistic" view of our political system as it operates in contemporary society. *Goss, 17.*

Irish and Protho, *The Politics of American Democracy*, 4th ed. (1968), $8.95

PS 201
NCSU

THE AMERICAN GOVERNMENTAL SYSTEM (3 s.h.). A descriptive analysis of the institutions of national government: Congress, the Presidency, and the Supreme Court. An analysis of the framework within which these institutions operate: the constitution and the federal system. An examination of the characteristics of the society which influence the patterns of national politics: the nature of the electorate, political parties and pressure groups. A brief examination of policies which have resulted from the interaction of all these factors. *Holtzman, 19.*

Irish and Prothro, *The Politics of American Democracy*, 4th ed. (1968), $8.95
Lipsitz, *American Government* (1967), $4.00 (used)

Pol. Sci. 51
UNC-CH

STATE GOVERNMENT IN THE UNITED STATES (3 s.h.). This is a study of the organization and operations of state governments and their relationships with their local governments and the U.S. government. *Light, 15.*

Beyle, *Politics and Policy in North Carolina* (1975), $7.50
Elazar, *American Federalism: A View from the States*, 2nd ed. (1972), $5.00
Palmer, *State Politics in the United States* (1972), $3.95
Sanford, *Storm Over the States* (1967), $2.45

POULTRY SCIENCE

The following course can be taken either as a university credit course or practical course. Should university credit be desired, an examination will be given at the end of the course. As a practical course, no examination will be required, and a certificate will be issued upon completion.

PO 200
NCSU

POULTRY PRODUCTION (3 s.h.). This course is the lecture portion of PO 201 and does not include the laboratory aspects. It covers the fundamental principles of broiler, market egg, hatching egg and turkey production. Identification of chicken and turkey classes, breeds and varieties. Breeding, incubation, raising, housing, feeding, disease and parasite control. Preparation for marketing of chickens, eggs and turkeys. *Parkhurst, 14.*

Card, *Poultry Production*, 11th ed. (1972), $11.00

PSYCHOLOGY

Psych. 10
UNC-CH

GENERAL PSYCHOLOGY (3 s.h.). This survey course gives an up-to-date picture of where psychology stands as a science. Covered in the course are the nature of psychological science, motivation and emotion, developmental psychology, sensation and perception, learning and memory, individual differences, personality psychology, clinical psychology, and social psychology. *Bryant, 19.*

Hilgard and Atkinson, *Introduction to Psychology*, 5th ed. (1971), $13.95
Atkinson & Atkinson, *Study Guide* (1971), $4.95
Scientific American reprints, set $4.80

RECREATION ADMINISTRATION

R.A. 73
UNC-CH

COMMUNITY RECREATION (3 s.h.). This course is a study of the concepts of leisure and recreation, the place of recreation in society, and its contribution to meaningful living. The primary focus is on the development of organized recreation in the United States as a result of the efforts of the Recreation Movement. *Meyer, 15.*

Yukic, *Fundamentals of Recreation* (1970), $5.95
Meyer, *Community Recreation: A Guide to Its Organization* (1969), $10.95
Madow, ed., *Recreation in America* (1965), $5.25

RELIGION

Rel. 22
UNC-CH

INTRODUCTION TO THE NEW TESTAMENT (3 s.h.). A basic guide to the history and literature of the New Testament and to the central figures and ideas of earliest Christianity. *Schutz, 10.*

Spivey and Smith, *Anatomy of the New Testament*, 2nd ed. (1974), $12.95
Upon request: May and Metzger, *The Oxford Annotated Bible, RSV*, $8.00

REL 321
NCSU

RELIGION IN AMERICAN LIFE (3 s.h.). This is a study of representative men, movements, and thought in the major religions within the American context. The course traces the historical development of these religious groups and examines the role of religion in the development of American society and culture. *Fitzgerald, 15.*

Hudson, *Religion in America*, 2nd ed. (1973), $5.95
Needleman, *et al.*, eds., *Religion for a New Generation* (1975), $6.95

RUSSIAN

Russ. 1
UNC-CH

ELEMENTARY RUSSIAN (3 s.h.). This is an introductory course designed to lay the foundation of grammar and to convey basic reading and pronunciation skills. Records are required. *Mihailovich, 25.*

Fayer, Pressman and Pressman, *Simplified Russian Grammar*, 3rd ed. (1963), $10.75
Allen III, *Workbook for Simplified Russian Grammar*, 2nd ed. (1965), $2.75
Records: (33 1/3 r.p.m.), $4.50

Russ. 2
UNC-CH

ELEMENTARY RUSSIAN (3 s.h.). The student will build on the foundations laid in Russian 1 in the language, and progress further toward mastery of the fundamentals of Russian phonology and grammar. Records are required. *Mihailovich, 25,* **prerequisite: Russian 1 or equivalent.**

Texts same as for Russian 1
Records: (33 1/3 r.p.m.), $6.00

Russ. 3
UNC-CH

INTERMEDIATE RUSSIAN (3 s.h.). The objective of this course is the completion of the basic Russian grammar. Extensive exercises are designed to consolidate the knowledge acquired in the first two courses, especially of the more difficult grammar. *Mihailovich, 25,* **prerequisite: Russian 2 or equivalent.**

Stilman and Harkins, *Introductory Russian Grammar* (1964), $7.75

Russ. 4
UNC-CH

INTERMEDIATE RUSSIAN (3 s.h.). The Russian grammar is thoroughly reviewed. At the same time, the student is exposed to short readings in Russian literature. A separate textbook and a record provide for basic and useful conversations. *Mihailovich, 25,* **prerequisite: Russian 3 or equivalent.**

Zawacki and Folejewski, *Intermediate Russian* (1962), $5.95
Ivanov, *The Saga of the Sergeant* (1966), $1.30
Maltzoff, *Russian Conversations for Beginners* (1959), $1.95
Record, *Russian Conversations* (33 1/3 r.p.m.), $4.98

SOCIOLOGY

Soc. 51
UNC-CH

INTRODUCTION TO SOCIOLOGY (3 s.h.). The structure and function of contemporary societies and social relationships are viewed. A study is made of the way societies are formed, how they achieve their organization and unity, and the way they change. *Falconer, 24.*

Chinoy, *Society: An Introduction to Sociology* (1967), $11.95
Selected Articles from the Bobbs-Merrill Reprint Series in the Social Sciences, $7.35

SOC 202
NCSU

PRINCIPLES OF SOCIOLOGY (3 s.h.). Introduction to the scientific study of man's behavior in relation to other men, the general laws affecting the organization of such relationships and the effects of social life on human personality and behavior. *Brisson, 15.*

Rose, *Sociology, The Study of Human Relations*, 3rd ed. (1969), $7.85 (used)
Lasswell, *Life in Society*, rev. (1970), $7.95

Soc. 53
UNC-CH

BLACK-WHITE RELATIONS IN THE UNITED STATES (3 s.h.). Designed (1) to introduce the student to minority relations as a field of study, (2) to assist in providing a perspective in which to view contemporary black-white relations, and (3) to challenge the student to rely upon disciplined and scientific inquiry in this subject, this course places major emphasis upon the power relationships which exist between a large dominant group and a smaller minority group. *Kain, 25.*

Billingsley, *Black Families in White America* (1968), $2.45
Clark, *Dark Ghetto* (1965), $1.75
Killian, *The Impossible Revoution Phase 2: Black Power and the American Dream*, 2nd ed. (1975), $3.95
Mack, *Race, Class and Power* (1968), $6.75
Meier, *From Plantation to Ghetto* (1970), $2.45
Yinger, *A Minority Group in American Society* (1965), $4.95

Soc. 54
UNC-CH

POPULATION PROBLEMS (3 s.h.). An examination of the major social and economic problems related to population growth and distribution in developed and less developed countries, and the solutions being proposed for these problems. *Falconer, 15.*

Breese, *Urbanization in Newly Developing Countries* (1966), $3.15
Callahan, *The American Population Debate* (1971), $2.50
Hartley, *Population: Quantity vs. Quality* (1972), $4.95
Population and the American Future. The Report of the Commission on Population Growth and the American Future (1972), $1.50
Population Reference Bureau. "Man's Population Predicament," *Population Bulletin* 26:2 (April, 1971), $.50
Population Reference Bureau. "The Brain Drain: Fact or Fiction?" *Population Bulletin* 25:3 (June, 1969), $.50
Scientific American. *Cities* (1965), $2.95

Soc. 62
UNC-CH

FAMILY AND SOCIETY (3 s.h.). The family is studied as a social institution which has economic and political ties and overtones. A study is made of the similarities and differences which are founded in various societal contexts. *Kain, 24.*

Leslie, *The Family in Social Context,* 2nd ed. (1973), $6.50 (used)
Norbeck, *Changing Japan* (1965), $1.50 (used)
Liebow, *Tally's Corner* (1967), $2.95
Komarovsky, *Blue Collar Marriage* (1967), $2.95

SOC 204
NCSU

CONTEMPORARY FAMILY LIFE (3 s.h.). The social organization of the family with special attention to socialization, marital choice, kinship relations, and the social changes affecting family structure and functions are considered. *Mercer, 14.*

Bell, *Marriage & Family Interaction,* 3rd ed. (1971), $12.50
Sussman, *Sourcebook in Marriage & the Family,* 3rd ed. (1968), $5.00 (used), $6.95 (new)

SOC 301
NCSU

HUMAN BEHAVIOR (3 s.h.). A study of the effects of social interaction upon individual behavior and personality; collective attitudes and behavior as products of group experience; analysis of fashions and fads, crowds, mobs, publics, social movements. *Sawhney, 19.*

Backman. *Problems in Social Psychology* (1966), $6.00 (used)
Secord, *Social Psychology* (1964), $12.50 (new) $9.00 (used)

SOC 306
NCSU

CRIMINOLOGY (3 s.h.). The study of causation, treatment, prevention and control of criminality and juvenile delinquency. Special emphasis is placed on socio-cultural theories of causation and on the examination of court and correctional systems of adults and juveniles. *Suval, 16.*

Gibbons, *Society, Crime and Criminal Careers* (1968), $8.20 (new), $7.00 (used)
Rushing, *Deviant Behavior & Social Process* (1969), $6.95

SOC 413
UNC-G

CORRECTIONS AND PENOLOGY (3 s.h.). Major sociological issues concerning the process of sentencing, incarceration and rehabilitation of juvenile and adult criminal offenders. Current correctional procedures and alternatives. *Humphrey, 13.*

Leinwand, *Prisons* (1972), $.95
Fox, *Introduction to Corrections* (1972), $11.95
Eldefonso, *Issues in Corrections* (1974), $5.95

SOC 402
NCSU

URBAN SOCIOLOGY (3 s.h.). A study of the factors in the growth of cities; the sources and consequences of such growth. A sociological approach to understanding various types of urban configurations both in terms of their present status and the prevalent patterns of change in them. *Davis, 15,* **prerequisite: SOC 202 or permission of instructor.**

Baali, *Urban Sociology—Contemporary Readings* (1970), $6.95
Boskoff, *Sociology of Urban Regions,* 2nd ed. (1970), $8.20 (used) $10.95 (new)

SOC 425
NCSU

JUVENILE DELINQUENCY (3 s.h.). The epidemiology of juvenile delinquency is explored. Descriptive typologies are compared. Theories of causation are developed with emphasis on social institutions, peer groups and socialization processes. Procedures for enforcement, adjudication and correction of young offenders are investigated. Strategies for prevention of delinquency are examined. Opportunities for observation and participation in agency operations are included. *Suval, 16,* **prerequisite: SOC 306 or six hours social science.**

Giallombardo, *Juvenile Delinquency* (1966), $6.20 (used)
Gibbons, *Delinquent Behavior* (1970), $7.50 (used)
Gold, *Delinquent Behavior in an American City* (1970), $3.95
Winslow, *Juvenile Delinquency in Free Society* (1968), $5.95

SPANISH

Span. 3
UNC-CH

INTERMEDIATE SPANISH (3 s.h). Stress is placed on the reading of Spanish of moderate difficulty. The translation of simple sentences into Spanish provides review of grammatical constructions. *Sharpe, 24,* **prerequisite: either two years of high school or one year of college Spanish.**

Gil, *Español contemporaneo* (1972), $3.80
Mihura, *Mi adorado Juan* (1964), $3.95
Iriarte, *Juego de niños* (1965), $4.50

Span. 4
UNC-CH

INTERMEDIATE SPANISH (3 s.h.). The purpose of this course is basically to improve the student's reading knowledge of Spanish. Three plays and three novelettes, all from the 20th century, have been selected to provide intellectual pleasure and stimulation to the reader as well as information about Spanish American life and culture. This is not a grammar course. *Sharpe, 24,* **prerequisite: Spanish 3 or equivalent.**

Castillo and Castillo, *3 novelas cortas—3 piezas teatrales* (1970), $6.50
Castillo and Bond, *University of Chicago Spanish Dictionary*, 2nd ed. (1972), $1.50

Span. 22
UNC-CH

MODERN SPANISH LITERATURE (3 s.h.). This course surveys the history of Spanish literature since the classical period, with special stress on the twentieth century. Extensive readings in Spanish from authors of this century are supplemented by background reading in English. *Sharpe, 24,* **prerequisite: Spanish 3-4 or 14-15, or equivalent.**

Patt and Nozick, *The Generation of 1898 and after* (1973), $6.50
Adams, *The Heritage of Spain* (1959), $7.80
Castillo and Bond, *University of Chicago Spanish Dictionary*, 2nd ed. (1972), $1.50

STATISTICS

Stat. 361
NCSU

INTRODUCTION TO STATISTICS FOR ENGINEERS I (3 s.h.). Survey of elementary statistical techniques useful to engineers and physical scientists. Includes introduction to probability, probability distributions, reliability of sample averages, reliability of differences between sample averages, tests of significance, the method of least squares for linear relationships between two variables and quality control. *Grandage, 8,* **prerequisite: college algebra.**

Bryant, *Statistical Analysis*, 2nd ed. (1966), $11.95

SPECIAL INTEREST COURSES (NON-CREDIT)

EIT
NCSU

ENGINEER-IN-TRAINING EXAM REFRESHER (non-credit). A review of engineering fundamentals consisting of solved sample problems and assignments designed to assist the practicing engineer in preparing for the Engineer-in-Training Exam (Exam 1). Topics covered include mathematics, physics, chemistry, hydraulics, kinetics, kinematics, statics, strength-of-materials, electricity, engineering economy, thermodynamics and others. *Edwards, 11, Fee $24.00*

Faires, *E. I. T. Review* (1961), $14.95

RE
NCSU

PRINCIPLES AND PRACTICES OF REAL ESTATE (non-credit). The course will cover the fundamentals of real estate. Topics include brokerage, appraising, management, finance, real property law, development, planning, etc. The course was approved in May, 1976, by the North Carolina Real Estate Licensing Board. *Dartt, 15, Fee $73.00*

Ring, *Real Estate, Principles and Practices*, 7th ed. (1972), $13.95
Ring, *Questions and Problems In Real Estate*, 3rd ed. (1972), $5.95
Webster, *N.C. Real Estate for Brokers and Salesmen* (1974), $9.95

Citz.
UNC-CH CITIZENSHIP (non-credit). Offered in cooperation with the United States Immigration and Naturalization Service to persons in the state who wish to become citizens of the United States, this course is designed especially for those who cannot attend citizenship classes. Several levels of the course are available, the number of assignments for each varying. *Cahill, Fee $8.00*

DENTAL PROGRAMS

UNC-CH DENTAL ASSISTING (non-credit). This complete seven-course program is equivalent to one academic year of study and includes the knowledges and skills recommended by the Council on Dental Education of the American Dental Association. Completion of all courses in sequence will qualify a person to be a candidate for certification by the American Dental Assistants Association. A brochure giving detailed information on the program may be requested from Independent Study.

UNC-CH DENTAL LABORATORY TECHNOLOGY (non-credit). This series of courses on the theory and skills required of a laboratory technician is designed to teach novice dental laboratory technicians and to teach more experienced technicians who need training in other areas. For complete information on the program, write Independent Study.

UNC-CH DENTAL RADIOLOGY FOR AUXILIARY PERSONNEL (non-credit). Equivalent to a 40-hour residence program, this course is designed to meet the Guidelines developed by the American Academy of Dental Radiology. It prepares persons to perform most dental radiographic procedures. *Access to dental radiographic facilities is required.* A brochure giving more details on the course may be requested from Independent Study.

GUIDED READING PROGRAM (non-credit)

UNC-CH Individuals who desire to continue their education through planned reading and who seek some direction in their self-study may choose the non-credit Guided Reading Program. GRP is being prepared as this catalog goes to press. Probable topics are Macroeconomics, Microeconomics, Marriage and the Family, Personality and Adjustment, and Readings in Business. Enrollment cost is approximately $25 plus books. Please inquire about the availability of this program by writing to Independent Study.

GENERAL INFORMATION

TO USERS OF THIS CATALOG

As participants in independent study, you become part of both a rich educational tradition and a bold new direction for learning. Since the late 1800's, when the demand for a winter continuation of the Chautauqua Institution's summer activities inspired the correspondence course, countless students have benefited from programs free from the constraints of classroom instruction.

In recent years, as the written word has been supplemented by such forms as records, cassette tapes, laboratory kits and television, and as programs have been designed with an increasing degree of flexibility, the traditional designation of "correspondence instruction" has come to be replaced by the more encompassing term "independent study." The University of North Carolina system embraces this term as an indication of the broadened scope of our offerings and as a symbol of our plans for the future.

While independent study programs encourage a large measure of individual responsibility by students and allow them to work in essentially whatever manner, time and place they choose, it is not the intention of these programs to leave students entirely on their own. On the contrary, the independent student is supported by the resources of the university to the same extent as the student who works on campus. Independent study is an important means by which the university extends its contribution to the larger community; it is with this role in mind that we have chosen to call ourselves Independent Study by Extension.

The learning resources which we seek to make available to the independent student are not limited to any one campus of the University of North Carolina system. With the reorganization of higher education in North Carolina into a consolidated university of sixteen institutions, new areas of cooperation have emerged. One has been the creation of a statewide program of independent study, envisioned as a means of using our resources in the most effective and appropriate ways. This catalog, and the course offerings it contains, represents the joint efforts of five member institutions of the University of North Carolina system: Appalachian State University, East Carolina University, North Carolina State University, the University of North Carolina at Chapel Hill, and the University of North Carolina at Greensboro. The Independent Study program is administered by the University of North Carolina at Chapel Hill.

We hope that the material in this catalog will help you find ways to satisfy your educational needs and interests, and that you will consider Independent Study by Extension a continuing source of assistance in your learning activities.

ELIGIBILITY

Independent Study courses may be taken for credit or non-credit by anyone who is prepared to study them with profit. There are no admissions requirements, and students are enrolled without respect to race, color, sex, national origin, or handicap. Becoming an Independent Study student does not constitute admission to a degree program at any University of North Carolina institution. (Students interested in admission should contact the admissions office of the campus where they wish to earn a degree for information.)

The Independent Study credit courses can be used toward a degree when appropriate to the student's own specific degree requirements. Students are responsible for making sure that courses fit their degree requirements.

Students currently enrolled in a degree program are requested to read the section on taking courses while attending classes on campus before registering for an independent study course.

ENROLLMENT

You may enroll in a course at any time during the year. Application must be made in writing on the forms provided in this catalog and mailed with a check or money order to Independent Study by Extension, University of North Carolina Extension Division, 121 Abernethy Hall, 002A, Chapel Hill, N.C. 27514. (Make checks or money orders payable to UNC Independent Study.) You should allow two weeks for delivery of your materials.

If you like, you may come directly to our offices (Abernethy Hall, UNC-CH campus) to enroll. No office enrollments will be accepted after 4:30 p.m. to allow our accounting office to close out for the day.

When you enroll you will receive a course study guide. In addition, you will need the textbooks and other materials listed after the course description in this catalog. These may be purchased from our bookroom. Specific instructions concerning your assignments and procedures will be included in the study guide; however, you should feel free to write your instructor or this office if you have questions. Please do not hesitate to call on us. As an independent study student, you are an important individual to us, and our goal is your success and satisfaction in learning.

COURSE LOAD

A student may not be enrolled in more than two courses at any one time. Students should check with their own campus to determine how many courses may be taken toward a degree there.

TIME LIMITS

You may enroll and begin work on a course at any time during the year. Your course will expire *thirteen months* from the date that you enroll. You may submit assignments at your own pace; however, you are encouraged to submit them on a regular basis.

If you are trying to complete your course in a short time, you must submit your assignments regularly. It is the educational responsibility of this institution to provide the teaching component of the independent study learning experience. Thus, we reserve the right to limit the number of assignments a student may submit within a short period of time so that the instructor's regular comments and guidance may be returned for the student's benefit as he or she progresses through the course. Students may not submit so large a number of assignments in so short a time that the teaching component is virtually bypassed. An average minimum completion time for students who are steadily working on a course is two to three months. Creative writing courses usually require a minimum of five months.

If you are meeting a deadline, allow two weeks for your grade to reach the Central Records office of the UNC campus from which your course is offered after you have taken your exam. If you need to have a transcript sent to another institution, allow additional time. *It is the student's responsibility to meet all requirements for completing the course prior to his deadline.* We suggest that you write your instructor and the Independent Study staff at least six weeks in advance of your planned completion date if you are trying to meet a deadline. Briefly explain your need and list the specific deadline and institution at which your course credit is to be reported.

Your instructor may have pressing time commitments, especially near the end of a semester or a summer session, causing delays in the usual return of graded assignments. During holidays and summers, instructors may be out of town. Students trying to complete a course by a specific deadline should allow extra time in case their instructor is unable to grade their work quickly.

Students who are unable to complete their courses in the allotted thirteen months may obtain *one extension* of six months by paying a $5.00 *renewal fee*. In some cases, such as the non-credit Dental Assistant Program, renewal periods will vary according to the course.

FEES

Fees must be paid in full at the time of enrollment. Independent Study accepts Mastercharge and BankAmericard. Please complete the appropriate section on the application if you wish to use a charge card. Note that:

1. Fees are subject to change without notice. It may be necessary to adjust fees between editions of the Independent Study Catalog.
2. Some courses have special fees which differ from the schedule below. These fees will be listed at the end of the course description.
3. Additional charges may be made for special materials and services for a few courses.
4. Partial refunds will be granted if a withdrawal request is received within *two months* of the enrollment. See the withdrawal section of this catalog for more details.

FEES

2 semester hour course	$55.00
3 semester hour course	$73.00
4 semester hour course	$90.00

POSTAGE

To cover the cost of postage expended in the delivery of course materials and graded assignments, please include the appropriate postage from the chart below with your application and fees. It is suggested that overseas students include postage for Air Mail, since Surface Mail often takes 2 to 3 months. Include either Air Mail or Surface postage for the total of both your graded assignments and course materials.

Domestic

(First class return of assignments, UPS delivery of course materials)	$6.50

Foreign

	Surface Mail	Air Mail
Graded assignments	$7.50	$16.00
Course materials	1.50	16.00
Total	$9.00	$32.00

GRADES

The grading system of the campus offering an independent study course will be used. The following grading systems are currently in effect: UNC-Chapel Hill, Appalachian State, UNC-Greensboro and East Carolina — A, B, C, D, F; NCSU — A, B, C, NC (No Credit).

Students may elect to take NCSU courses for *credit-only*. UNC-Chapel Hill courses may be taken *pass-fail*. Requests for these alternative grading systems must be made at the time of enrollment and cannot be changed at a later date. Individuals should be certain that the *credit-only* or *pass-fail* grade will be acceptable in the degree program they are pursuing.

If an instructor finds that the English composition of a student taking a Chapel Hill course is below the campus standard, he may add a composition condition (cc) to the final grade of that student. A cc may be removed by the completion of English 0 by correspondence or the Writing Laboratory on the Chapel Hill campus. A student cannot graduate until the cc is removed.

Grades for credit courses are recorded at the Central Records office of the campus offering the course. Records for courses taken for non-credit are kept at the Independent Study office.

STANDARDS

Independent Study places upon all enrolling students the responsibility for adhering to a standard of honesty and self-discipline. Students are expected to do their own work in all aspects of their course. Your signature on your application certifies that you agree to maintain this standard.

EXAMINATIONS

A final supervised examination must be passed if credit is to be given. Examinations must be supervised at an accredited college, university, community college, or technical institute which is accessible to the student. Students are asked to sign a pledge when they take examinations certifying that they have neither given nor received aid while taking the exam. All assignments must be submitted for grading prior to taking a course examination.

TEXTBOOKS

A bookstore of over 350 different volumes is maintained for the use of Independent Study students. Books are offered at competitive prices. You may purchase books for your course anywhere you desire, but if you purchase them from us, we will make every effort to mail them promptly. Should you choose to purchase them elsewhere, you should wait until you receive your course syllabus to be sure that you buy the correct edition of your texts.

Required texts are listed with each course. PUBLISHER'S PRICES ARE SUBJECT TO CHANGE; thus our prices are subject to change without notice. Used books may be available for some courses. If you wish to purchase used books, indicate this on your application. Send money to cover the price of new books, and if used books are available, we will issue you a refund.

If you wish to secure the required texts from us, please complete the Book Order form which is included on the application for enrollment, or send us a letter. Payment must accompany your order. If supplementary reading materials or books for book reports are not available to you locally, you may contact our office for assistance.

LIBRARY SERVICES

North Carolina residents having trouble locating supplementary textbooks are encouraged to ask their local librarian to request an Inter-Library Loan from the North Carolina State Library. In-state residents receive an indentification which can be used to obtain a library card at any one of these university libraries: Appalachian State, East Carolina, UNC-Greensboro, UNC-Charlotte, NC State University, and UNC-Chapel Hill.

SELLING TEXTS

Our bookroom will repurchase texts if they are in good condition and are still in use with our courses. Students wishing to sell their books should contact our bookroom before mailing the books to us to see if they can be repurchased. When returning books, be sure to include your name and current address.

ADDRESS OR NAME CHANGE

If your address or name changes during the time you are enrolled, please send the name and address under which you enrolled, your new name and address, the date, and the course in which you are enrolled to Independent Study.

COUNSELING

A staff member of Independent Study is available to counsel any student who chooses to use this service when a need arises. Students having difficulty in or failing a course may want to write Independent Study for assistance. An office appointment can be arranged if it is desired.

Students who are interested in improving their study habits may want to obtain the following publication from the Independent Study bookroom: *How to Study*, by Thomas F. Staton, $1.00.

REFUNDS

If for any reason you should decide that you must drop your course, complete the form on page 31 of this catalog and mail it to Independent Study. Partial refunds will be granted providing the request is made within *TWO MONTHS* of the enrollment date. No refunds will be made after this period.

TRANSFERS

A student may transfer from one course to another if the request is made within *TWO MONTHS* from the enrollment date. The student must pay a fee of $8.00 plus the actual cost of any graded assignments in the course being dropped. New textbooks may be purchased from the Independent Study bookroom. The bookroom will consider repurchase of the texts from the original course at a percentage of their original cost, depending on their condition. Enrollments may not be transferred from one student to another. Transfer requests made after the two month period will be considered on an individual basis.

COMBINING CAMPUS AND INDEPENDENT STUDY

If you are attending a campus session at any institution, you must have the written approval of your Academic Dean sent to the Independent Study offices for each semester or summer session you are enrolled in order to continue working on your course.

If you do not want to continue with your independent study course while enrolled for residence work, or if you are unable to secure permission, you may let us know each semester or summer session you are in residence, and request that additional time be allowed to complete the course later. If you fail to let us know you are in residence without permission, your course will expire thirteen months from the day you enroll.

You may submit assignments during official school holidays and semester breaks without permission.

CREDIT

Degree Credit — Credits earned through Independent Study may be used toward a degree, providing the course is applicable to the individual student's requirements. *Students who are completing a degree program at any institution should check with their academic advisor or dean prior to enrolling in a course to make sure the credits will be acceptable. Graduate credit may not be earned by Independent Study.*

Non-Credit — Those who do not desire or expect credit are permitted to register for any course for which they are qualified. Non-credit students are given the same careful instruction as those who study for credit. No permanent record of the grade will be made.

FINANCIAL AID

1. Student Aid

Loans and a few scholarships (for students with exceptional academic records) may be available to students who have financial need. For information and application blanks, write to the Director of Student Aid at the campus from which you are earning your degree.

2. Vocational Rehabilitation

Under certain circumstances, the Vocational Rehabilitation Division of the State Department of Public Instruction will pay the fees for those who have a physical disability. For full information, contact the Director in Raleigh, N.C.

3. Veterans

All eligible veterans who have completed 181 days or more of active service and who intend to pursue a course by independent study as part of their degree requirements should complete the application in the center of the catalog and THE VETERAN'S STATEMENT on page 37 of the catalog. These forms, accompanied by *full* payment, should be submitted to Independent Study by Extension, 121 Abernethy Hall 002A, University of North Carolina, Chapel Hill, N.C. 27514.

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STUDIES IN ADULT EDUCATION

SOCIAL NETWORKS AND SELF-PLANNED ADULT LEARNING

CLARK LUIKART

Extension Division
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STUDIES IN ADULT EDUCATION

SOCIAL NETWORKS AND SELF-PLANNED ADULT LEARNING

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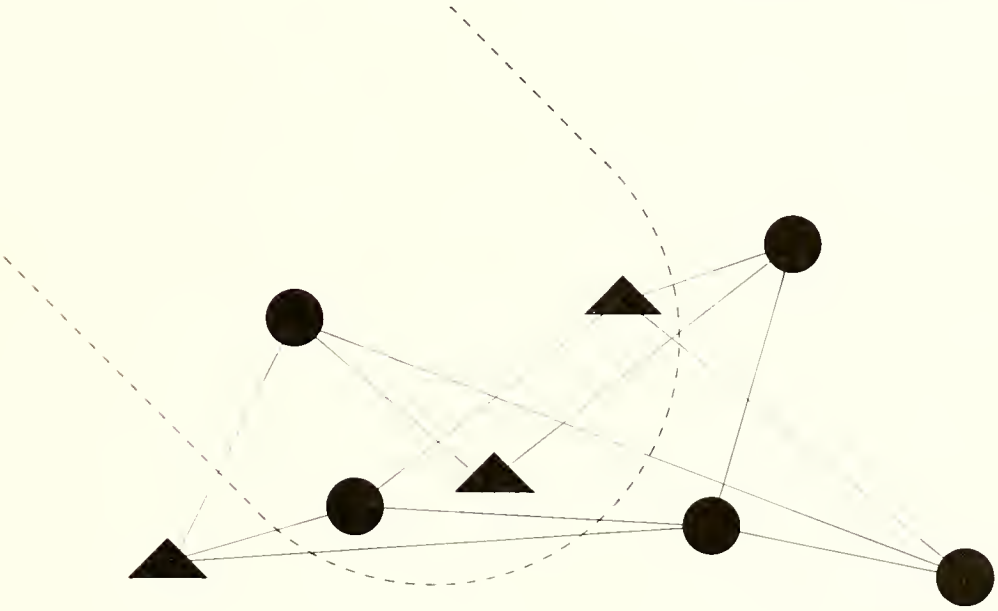

UNIVERSITY OF NORTH CAROLINA EXTENSION BULLETIN

Volume LVI March, 1977 Number 2

U378
U73

ACKNOWLEDGEMENTS

Although primary responsibility for planning, initiating, and conducting the self-planned learning project reported on the following pages was assumed by the author, help was received from members of his personal social network. A special note of thanks is due to the following helpers: H. Huff, D. Rhyne, G. Wilson, A. Tough, M.L. Symons, K.J.G. Smith, K. Lee, S. Funk, L. Wiedman, Mary Ellen, and Hack.

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CHAPTER I

INTRODUCTION

It is common for people to set learning goals and to attempt to gain new knowledge and skills. Such intentional efforts to learn are of interest to adult educators because frequently people who want to learn something become clients of continuing education programs. It is equally commonplace, if not more so, for people to attempt to learn things on their own. Many adults decide to act as their own teachers, and assume the primary responsibility for planing, initiating, and conducting their own learning experiences. Such behavior, which can be called self-planned learning, is the focus of the present investigation.

Research on learning behavior has, until recently, tended to ignore the intentional self-planned learning efforts of adults. According to Travers (1963) when one examines the history of research on learning in the last century, two distinct approaches may be seen.

> One approach is based upon the point of view that research on learning is best conducted in schools and in realistic settings where education is actually in progress; the other is represented by those who have sought to

> study learning phenomena under simplified conditions in the laboratory (p.2).

Recently, however, research initiated by Tough (1965, 1971) suggests that there is a third fruitful approach: the study of intentional efforts to learn outside of the laboratory and outside of educational institutions. If one of the ultimate aims of adult educators is to design and provide more effective help for adult learners, then research must be conducted which will describe how learning proceeds in its natural form in daily life.

The available evidence indicates that over half of the intentional learning efforts of adults are self-planned and conducted outside of the institutional framework of adult education (Coolican, 1974; Tough, 1971). Adults undertaking self-planned learning do obtain a great deal of help, but they do not use educational institutions as resources. Most of the information and assistance received by self-learners comes from a pool of resources which may be termed their "personal social network": the people that the learner knows and interacts with in the course of everyday life, such as relatives, friends, neighbors, and other acquaintances (Macdonald, 1973; Tough, 1965, 1971).

Personal social networks may vary in a number of different structural dimensions: their size, their composition, and their density (cohesiveness: i.e., the extent to which individuals in the network know and interact with each other). Recent reviews of social network research (Bott,

1971; Mitchell, 1969) suggest that the structural characteristics of personal social networks are associated with variations in information seeking and goal attainment- behavior which is similar, though not identical, to the attempt by self-learners to mobilize resources for assistance in achieving their intentional learning goals.

It appears likely that an evaluation of the differences in the amount and type of help self-learners receive would be facilitated by an analysis of the variations in the structure of their personal social networks. The study reported in the following pages attempts to use a method of network analysis and apply it to the investigation of the help received by self-learners in their intentional learning efforts.

Purpose

The purpose of the present study was to describe the relationship between the structural characteristics of an individual's personal social network and the amount, source, and type of assistance received during self-planned learning. More specifically, the goals of this investigation were:

1. to assess the degree of association between selected structural characteristics of an individual's social network and the amount, source, and type of assistance received during self-planned learning;
2. to identify types of personal social networks

by clustering a sample of self-learners who had social networks with similar configurations of network properties;

3. to examine if the resulting clusters of subjects differed in the amount, source, and type of assistance they received during self-planned learning; and
4. to assess the relative importance of the network characteristics in predicting the amount, source, and type of help received in self-planned learning.

Definitions

The following brief definitions are introduced to delineate the terms used in the present study. A more complete explanation and discussion of these terms is presented in Chapter II which reviews the relevant literature. Operational definitions of the key concepts and variables are found in Chapter III which describes the method and procedures employed.

Learning projects: an adult's intentional effort to gain and retain certain fairly clear knowledge and skill, or to produce some other lasting change in himself. A sustained, highly deliberate effort to learn.

Self-planned learning: a learning project in which the adult decides to act as his own teacher and assumes the primary responsibility for planning, initiating, and conducting his own learning.

Helpers: the people who the adult learner uses in order to gain information and assistance for his learning project.

Amount of help: the number of people the adult learner uses as helpers.

Type of help: the quality and duration of the assistance obtained by the adult learner ranging from help received only once or twice to more sustained help which was obtained three times or more.

Source of help: the social relationship between the adult learner and his helper - - whether the helper was a relative, friend, or someone else (not a relative or friend).

Network: a metaphor used to describe people (points) and the relationship between people (lines). The concept describes the interpersonal relationships between friends, neighbors, colleagues, and relatives: the links between people which cut across institutions (formal groups) or demographic boundaries and "which may form a basis for the mobilization of people for specific purposes under specific conditions" (Whitten & Wolfe, 1974, p. 720).

Partial network: the way in which the concept of network is given some useful focus and limitation; "any extract of the total network based on some criterion applicable throughout the whole network" (Barnes, 1969, p. 57). One criterion frequently used is to anchor the network on a single individual (commonly called "ego" in anthropological

research).

Personal network: those social links between one person (ego) and other people; "the individual's (personal) social network consists of those persons with whom he maintains contact and has some form of social bonds" (Adams, 1967, p. 64).

Intimate network: an extration or portion of the personal social network which includes those persons who ego defines as "important" or "close" and who he maintains regular voluntary social interaction.

Extended network: a term used for comparison with the intimate network. The extended network is identical to the entire personal social network.

Method and Procedures

The method and procedures summarized below are described in detail in Chapter III.

Variables

The major variables being investigated were divided into two sets: those related to help received during self-planned learning; and those related to the structural characteristics of the learner's personal social network.

The dependent variables included the amount, source, and type of help received by the self-learner.

The independent variables included the size, density, and composition of the learner's personal social network.

Sample

The data on self-planned learning and social networks

were collected in the Spring of 1974 from fifty adult self-learners residing in the Durham and Chapel Hill area. The sample was drawn from a list, obtained from three high schools, of white male non-college bound adults (ages 18 to 25) who had probably not attended any educational institution during the previous six months. Individuals included on the list had either dropped out of high school or had not had their transcripts forwarded to any educational institution during the previous five years. Six hundred and sixty-one names were obtained. The desired sample size was fifty. Consequently, 100 individuals were randomly selected from the total of 661 names. Eighty individuals were approached before data were collected on the self-planned learning of fifty subjects.

Instrumentation

The amount, source, and type of help received (dependent variables) were measured using questionnaire items originally developed by Tough in 1965 and refined by him and others in 1971. Size, density, and composition of the learner's personal social network (independent variables) were measured by using sociometric questions and open-ended interviewing developed on the basis of guidelines suggested by Mitchell (1969) and Bott (1971).

Collection of Data

Data were collected through an in-depth interview which lasted a total of from two to three hours and which often required several separate meetings with each subject. In-

terviews were conducted in the subject's home.

Analysis of Data

The data collected were comprised of two sets of variables: multiple dependent variables (amount, source, and type of help) and multiple independent variables (size, density and composition of the personal social network). The following phases of analysis, which correspond to the sections presenting the results in Chapter IV, were adopted so that each set of variables would be placed within a context prior to the analysis of the relationship between the two sets of variables.

Phase 1: the extent of self-planned learning (description of the dependent variables).

Standard descriptive statistics (means, standard deviations, range, and proportions) were used to summarize the self-planned learning activity of the subjects. Emphasis in this phase of the analysis was on the amount, source, and type of assistance the subjects received while conducting their self-planned learning projects: data which would be used in subsequent analysis in conjunction with the structural properties of the personal social networks.

Phase 2: the personal social networks (description of the independent variables).

Cluster analysis was used to find out if the personal social networks of the fifty subjects did form distinct patterns and distinct groups. Scores on the structural characteristics of the networks were transformed to standard

scores in order to facilitate the comparison between the resulting clusters.

Phase 3: the relationship between the structural characteristics of the personal social networks and help received in self-planned learning.

Canonical correlation analysis was used to assess the degree of association between the two sets of variables.

Multivariate analysis of variance was used to examine whether mean scores on measures of the amount, source, and type of help received were different for the network clusters identified in Phase 2 of the analysis.

Finally, in order to assess the relative importance of the network characteristics in predicting each of the variables related to the help received, step-wise multiple regression analysis was used.

The .05 level of confidence was used in testing the significance of multivariate and univariate F ratios, correlation coefficients, beta weights resulting from the step-wise multiple regression analysis, and the canonical correlation coefficients.

Organization of the Study

Chapter II provides the background for the present investigation by reviewing the relevant literature related to self-planned learning and social networks. Chapter III describes the methodology used in the study: selection of the sample, specification of the variables and how they were operationalized, instrumentation, procedures for gathering

the data, and analysis of the data, Chapter IV presents the results. Chapter V summarizes the findings and presents the conclusions of the study.

CHAPTER II

REVIEW OF THE LITERATURE

The relevant literature providing a background for the present investigation, which describes the help obtained by adults during their intentional learning efforts, is confined to two recent research traditions. These traditions are the study of intentional self-planned learning efforts and social networks.

Self-Planned Learning

Background

Adult education now has a large body of research findings on the socio-demographic characteristics (Johnstone & Rivera, 1965; Knox, 1965) and motivation (Boshier, 1971; Burgess, 1971; Houle, 1961; Litchfield, 1965; Morstain & Smart, 1974; Sheffield, 1964) of adults who enroll in continuing education programs. One of the assumptions underlying research on the clients of adult education was that an understanding of the characteristics and motivation of people participating in adult education would provide clues into the educational pursuits and learning behavior of adults and, as a result, give adult educators some guidelines to follow in designing more effective educational programs. The problem with this assumption was two-fold: first, it limited the information available about educational pursuits

to the responses made only by clients of continuing education programs; second, it tended to equate the single act of enrolling in educational programs with the entire range of intentional learning behavior of adults in everyday life.

In 1965, findings from a national survey conducted by the National Opinion Research Center (Johnstone & Rivera, 1965) suggested that the total educative activity of adults in the United States included a significant amount of learning behavior outside of educational institutions. Approximately one person in five had been active in some form of intentional learning during the twelve-month period just prior to June, 1962. Of all the adults who reported at least one educational activity during the year, 7.9 percent had engaged in self-planned learning. Though this percentage appears small, it represents nearly nine million people in the population. The authors stated that the incidence of self-planned learning among adults was "surprising" and "much greater than anticipated". They suggested that "the category may well represent the most overlooked avenue of educative activity in the whole field" (Johnstone & Rivera, 1965, p. 34).

The incidence of self-planned learning might well have been greater than was reported in the Johnstone & Rivera study if the interview had been conducted differently. The category self-planned learning was added as a "residual category" and measured by only one question in the survey instrument. Further, while <u>all</u> courses that involved

instruction were recorded the interview schedule had space to record only two self-planned learning subjects. No attempt was made to apply, or explain to the interviewee, any criteria for deciding whether a particular example of learning should or should not be included. Interviewers did not explain the question, encourage the respondent to consider various possible examples of self-planned learning, or probe into the meaning of the subject's responses.

In a later study of adult information seeking in two communities, again in response to one question, the percentage of individuals who had undertaken independent study in the five years prior to the interview was 43 percent. Of eight types of adult education activity (evening classes, lectures, group discussions, on-the-job training, private instruction, correspondence courses, television, and independent study) "in general, the most frequently reported mode of participation was independent study" (Parker & Paisley, 1966, p. 143).

Beginning with Allen Tough's work in 1965, a systematic inquiry of the self-learner began to emerge as a part of a larger research effort which emphasized all the adult's intentional efforts to learn in everyday life -- in and out of educational institutions (Tough, 1965, 1968, 1971). Tough has termed intentional learning goals and activities "learning projects". He described a learning project as

> a series of related episodes, adding up to at least seven hours. In each episode, more than

> half of the person's total motivation is to gain and retain certain fairly clear knowledge and skill, or to produce some other lasting change in himself. For convenience, we have adpoted the shorthand label 'learning project' to refer to this series of related episodes: a sustained highly deliberate effort to learn (Tough, 1971, p. 6).

Tough's definition of the learning project, which is adpoted in the present investigation, focuses on deliberate learning efforts, not the multitude of phenomena and forces that produce changes in a person without his desire to learn. Excluded from this definition are native response tendencies (such as instinct or reflexes) and changes which occur through forces beyond a person's control (such as maturation, fatigue, habituation, or illness). The meaning assigned to the phrase "learning project: a highly deliberate effort to gain knowledge and skill" is similar to the learning theorists' definition of learning (Hilgard & Bower, 1966, pp. 2-6).

The concept of a learning project includes a wide range of topics including planning for a career, specific tasks and problems encountered on a job, home and personal responsibilities, sports, and hobbies. Some efforts to learn may be relatively brief or superficial, such as learning about automobiles in order to buy the best model. Others, like religious conversion, may involve long term commitments and fundamental changes in personality and behavior.

The instrument Tough designed to elicit information about learning projects involved an in-depth interview with the learner. In his interviews, he used long lists of subject matter and learning methods to stimulate recall. Instead of asking only one general question, he tried several different ways of asking the person to recall additional projects. A two hour interview was devoted exclusively to discovering all the person's learning projects during the preceeding six months and to gathering certain basic data which described the extent of the learning efforts, the resources used, the motivation of the learner, the decision involved in planning, and problems encountered while conducting the projects.

In Tough's 1970 survey of learning projects, 66 adults conducted 538 learning projects during the six months before the interview. Each subject undertook at least one or two learning projects, and some as many as 15 to 20. The learners spent an average of 700 to 800 hours, with some individuals indicating that they had spent more than 2000 hours in deliberate learning projects in the previous half a year. Less than five percent of the adults who undertook intentional learning activities used adult educational institutions as resources. Approximately two-thirds of the learning efforts were self-planned (Tough, 1971).

The findings from Tough's 1970 survey suggested that a large segment of our population conducted intentional efforts to learn outside of educational institutions. Although the

samples which composed the survey were very small, and not randomly selected from a large population, the data were encouraging enough to indicate that further research on self-planned learning could be valuable.

Since Tough's exploratory study in 1970, at least five studies which utilized Tough's definitions and instrument have been reported (Coolican, 1973; Denys, 1973; Johns, 1973; Johnson, 1973; McCatty, 1973). Although not all of these studies specifically examined self-planned learning, they did report a high incidence of the phenomena: ranging from 56 percent in an investigation of pharmacists' learning activities (Johns, 1973) to 76 percent for a sample of business executives (McCatty, 1973).

Resources for Self-Planned Learning

It is possible to imagine adults deciding all of the detailed day to day content and strategy for their self-planned learning projects without any help whatsoever from any other person or resource. Tough, however, has found that this is rarely the case.

> It seems clear that few, if any, learners decided their detailed content and strategy without help. On the contrary, during a self-planned learning project, the typical adult obtains an astonishing amount of help from a large number of individuals and other resources (Tough, 1971, p. 97).

Tough reported that during his initial research on adult learning, he was impressed with the way adults organ-

ized their account or their self-planned activities.

> They recalled and described such projects by means of the individuals and other resources that had helped them. Their narrative revolved around their experiences with first one resource and then another (Tough, 1971, p. 97).

In his 1965 study of self-planned learning, Tough devised a list of twelve teaching tasks, each of which described a major decision or action that could be performed by a self-learner during the course of conducting his learning project. The twelve tasks, as summarized by Tough, were:

1. choosing the goal;
2. deciding which activities are appropriate for achieving that goal;
3. obtaining the printed materials and other resources;
4. estimating the current level of the learners knowledge and skill;
5. dealing with difficulty in grasping certain parts;
6. deciding when to learn;
7. deciding where to learn;
8. deciding how much money to spend;
9. dealing with lack of desire for achieving the goal;
10. dealing with dislike of the activities necessary for learning;
11. dealing with doubts about success; and
12. deciding whether to continue (Tough, 1967, pp 4-5).

In fact, these twelve teaching tasks defined problem areas for which self-learners frequently sought and received help. Tough reported that during a self-planned learning project the typical adult obtained a great deal of help for these twelve tasks from a large number of people.

In 40 interviews with college graduates, data were collected on 40 self-planned projects. The subjects gained help on the twelve teaching tasks from a total of 424 people (Tough, 1967). All 40 learners received help from at least four individuals, through direct contact and interaction. His subjects, on the average, obtained help from 10 people, and a few learners from more than 20. The majority of the helpers were classified into the following types of helpers: intimates (the self-learners' parents, siblings, spouse, children and close friends) and acquaintances (friends, relatives, and colleagues). Tough reported, "it became evident that the learner's relationship to his social and physical environment is extremely important in his efforts to plan a learning project"(Tough, 1971, p. 97).

In later research, Macdonald (1973) found that the least important reasons for choosing a particular individual as a resource for a learning project were his expertise, his education, his relevant experience, or the recommendations of others. Invariably, the most frequently used interpersonal resources were those individuals with whom the learner frequently interacted (friends and acquaintances, colleagues, members of the learner's family, and neighbors).

Related research on information seeking (American Psychological Association, 1964; Menzel, 1958, 1960; Parker & Paisley, 1966; Rees & Paisley, 1968) and the diffusion of knowledge (Havelock, 1969; Rogers, 1971) supports the finding that interpersonal resources are extremely important, but it also suggests that very little is known about the search process of individuals attempting to gain information for some specific purpose (Knox, 1970) or the characteristics of the social relationships surrounding people which influence their ability to obtain information (Havelock, 1969).

Summary

The studies reviewed have added to the growing knowledge of the range of intentional learning efforts of adults. They have introduced the concept of self-planned learning and have also suggested that self-planned learning behavior is quite common. Further, self-learners obtain a great deal of help from people they know best. There are, however, gaps in the literature, particularly on the help obtained by self-learners.

First, in studies which have explored the question "who provided help?" (Coolican, 1973; Macdonald, 1973; Tough, 1967), no attempt was made to investigate the relationship between the people used as resources and other individuals known to the learner who might have been asked for assistance. Tough, for example, reported the number and types of helpers used for 12 teaching tasks in a self-

planned learning project, but he did not describe the sources of assistance within a context of what must be a larger number of intimate and less intimate friends, relatives, and acquaintances known to the learner.

Secondly, because of the method used for recording the data, Tough (1967) was unable to report whether certain individuals provided help once, twice, or a number of times. In addition to finding out the total number of helpers, as a measure of the amount of assistance obtained, some consideration should be given to the amount of help provided by the most frequently used resources.

Finally, the present study proposes a different approach to the study of the help obtained by self-learners. It does not attempt to describe the characteristics of effective help (Tough, 1971), helping relationships (Rogers, 1961), or ideal types of helpers (Macdonald, 1973). Instead it attempts to analyze the social environment in which self-planned learning takes place by focusing upon the social structures associated with help received by self-learners.

Social Networks

Background

The literature of social anthropology provides a method for describing the naturally occurring social organization of persons a learner might consider as resources of information and assistance - - namely a method based on the notion of social network. In the 1950's several researchers

(Bott, 1957; Caplow, 1955; Henry, 1958; Katz, 1958) noted a gap in the models used to describe human collectivities. At that time, there had been little discussion or research on "quasi-groups", i.e., collections of individuals who know each other and engage in social interaction and yet do not constitute an organization, formal group, or merely an unrelated aggregate of people. The concept of a social network was used to describe the interpersonal relationships between friends, neighbors, colleagues, and relatives: the links between people which cut across institutions (formal groups) or demographic boundaries "which may form a basis for the mobilization of people for specific purposes under specific conditions" (Whitten & Wolfe, 1974, p. 720).

In its broadest sense, the term "network" was originally defined, in one of the earliest examples of what is now known as "network analysis", in the following way:

> Each person is, as it were, in touch with a number of people, some of whom are directly in touch with each other and some of whom are not. . . . I find it convenient to talk of a social field of this kind as a network. The image I have is of a net of points some of which are joined by lines. The points of the image are people, or sometimes groups, and the lines indicate which people interact with each other (Barnes, 1954, p. 43).

Mitchell (1969), in his very useful essay which not only reviewed the literature of network analysis but also described a set of criteria for analyzing networks, provides the general orientation adopted in the present research: a network is

> specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behavior of the persons involved (Mitchell, 1969, p. 2).

The fundamental concern of network analysis is not on the attributes of people in the network but rather on the characteristics of the interactional and organizational links between social units. In this sense, the approach was similar to sociometric analysis, which identified particular patterns of group structure which were associated with variations in communication patterns and group performance in experimental settings (Cartwright & Zander, 1968). Though there are examples of the application of sociometric methods to field studies (Coleman, Katz & Menzel, 1957; Festinger, Schachter, & Back, 1950), the approach more commonly used in the study of naturally occuring informal groups has been the network analysis originally developed by British social anthropologists.

The research which had the greatest impact in stimulating network analysis was Bott's (1957) study of variations in conjungal roles among twenty London families (1971).

Bott noted that there was considerable variation in the way husbands and wives performed their conjugal roles.

> At one extreme was a family in which the husband and wife carried out as many tasks as possible separately and independently of each other. . . . At the other extreme was a family in which husband and wife shared as many activities and spent as much time together as possible (Bott, 1971, p. 52).

Attempts to explain the variations in conjugal roles in terms of phase of development in the life cycle, social class and type of local area in which the family lived were not successful. Bott noted, however, that the external relationships of the families assumed the form of a network rather than the form of an organized group. Further, she noted that the networks differed in "connectedness" (or density) which was defined as the extent to which the people known by the family knew and met each other independently of the family. The word "close-knit" was used to describe a network in which there were many relationships among the component units (i.e., a high degree of connectedness) and the word "loose-knit" to describe a network in which there were few such relationships. Bott found that the segregation and integration of the conjugal roles within the family were related to the degree of connectedness in the network of the family - - the more connected the network, the greater the degree of segregation between the roles of husband and wife.

Bott's research was one of the first attempts to interpret social action in terms of the relationship of linkages within a social network. It had the effect on subsequent research of associating the notion of social networks almost exclusively with conjugal roles. Later, however, as shown in the collection of research studies edited by Mitchell (1969), several British social anthropologists were able to see the significance of the ideas developed by Bott and applied them to problems of migration (P. Mayer, 1961), political influence (A. Mayer, 1966), leadership (Wheeldon, 1969), the resolution of a work dispute (Kapferer, 1969), and assistance during bereavement (Boswell, 1967). It became clear, through these studies and others, that social networks could be used to interpret behavior in a wide variety of social situations and clearly were not limited to the study of conjugal roles alone.

Structural Characteristics of Social Networks

The concept of a social network in studying individuals in natural settings has, since Bott, been used in the literature of social anthropology in relation to two different problems, similar to those studies in experimental small group research. First, variations in the morphology and interaction of social networks have a noticeable relationship to the variations in patterns of information seeking and communication flow (Barnes, 1954; Bott, 1957; Epstein, 1969; P. Mayer, 1961; Sheingold, 1974). Secondly,

social networks are used by individuals to achieve desired ends: to gain access to resources and to manipulate the flow of goods, services, and information (Adams, 1967; Boswell, 1969; Craven, 1971; Granovetter, 1973; Kadushin, 1968; Kapferer, 1969; A Mayer, 1966).

Both of these problems have involved the analysis of the following structural features of social networks: the size of the social network (the number of people who may be contacted); the density (the degree to which individuals in the network know and interact with each other); and composition (who is in the network - - relatives, friends, acquaintances, etc.).

Size. "The most important structural criterion of a person's network, whether total or partial, it its size. This is because the other criteria are calculated as a proportion of the total possible, or actual, links in the network" (Boissevain, 1974, p. 16). Size of the network is of particular importance in the examination of "action sets", or a temporary group of individuals recruited from the personal network through various channels to serve some short term end. "The action set is composed of network links mobilized for a specific and limited purpose" (A. Mayer, 1966, p. 115). The study of "action sets" has been frequently conducted without reference to the total size of the personal network, although there is obviously a clear distinction between the two.

An action set is delineated in terms of the

> specific transaction that brings it into being. A personal network on the other hand denotes a set of linkages which exist simutaneously on the basis of different interests and which persist beyond the duration of any particular transaction (Mitchell, 1969, p. 39).

In the present investigation, the action set is brought into being on the basis of the particular learning projects of the learner and the particular learning tasks for which the learner attempted to get help. The action set is composed of helpers who may at the same time exist as members of the learner's personal network (intimate or extended) on the basis of kinship or friendship. The latent links - - those links not used in reference to the action set problem of finding help for a self-planned learning project - - may be important in explaining the amount and type of help a learner receives. As noted above, in the study of self-planned learning, although Tough determined the number of helpers used by a self-learner, he failed to describe the relationship between the number of helpers and the total pool of resources.

Research by Wheeldon (1969) and Kapferer (1969) demonstrated that the size alone of an individual's network may be a significant feature of a personal network if the emphasis is on mobilizing support for some goal. It follows that the larger the number of resources an individual has to choose from, the greater may be his ability to mobilize the necessary resources for his particular purposes. There

are, however, other considerations noted below.

Density. Whitten and Wolfe (1975) noted that "connectedness or something like it (density, knit, or mesh) has been more frequently cited as a significant characteristic of networks than any other type of measure or limitation" (p. 726). Unfortunately, there is a difficulty in assessing and comparing the findings related to density because the term is defined and measured in a variety of ways (although most definitions are similar to the description of "connectedness" given by Bott). There has not been enough empirical evidence cited in the literature to establish standards for such terms as "close-knit" and "loose-knit". These are relative terms: relative to the sample under investigation. Bott, for example, maintained:

> Strictly speaking 'close-knit' should read 'close-knit relative to the networks of the other research families' and 'loose-knit', 'loose-knit relative to the networks of other research families'. These are shorthand expressions of relative degree of connectedness (Bott, 1971, p. 59).

Nevertheless, in addition to Bott's research, which has already been briefly summarized, the studies cited below do suggest that the concept of density, as the extent to which the people in a network know and interact with each other, is an important structural characteristic of social networks.

P. Mayer (1961) found that close-knit networks tended to insulate the individual from outside information and exert pressure on members to conform to the norms of the network. Mutual assistance, he suggested, in a dense network might depend upon whether the aid required reinforced the norms of the group. Research by Granovetter (1973) suggested that in the case of relatively tangible goals (getting a job, finding materials, getting information) a loose-knit network provided access to more varied sources of information, from a greater variety of people than a more dense personal network. Dense, close-knit networks, though, were likely to be quite useful in providing more sociability and support, in which trust was important. Research by Wellman, et.al. (1973) indicated that the availability of support from close friends, and kin ("intimates") increased as the density of the links in the intimates' network increased.

The issue becomes somewhat more complicated in situations where there is a strong emotional overlay or the need for getting access to tangible resources as in the "family business" (Ianni, 1972) and the search for an abortionist (Lee, 1969). Lee (1969) found, for example, that the first contacts made by searchers were often with intimates, but the pressure of having to get the information in the short time within which abortion is possible occasionally forced the searchers to contact people with whom they had only the weakest of ties.

It appears that it is not only how many close intimates an individual has who are available to provide support that affects the nature and availability of these emotional resources, but how closely linked these intimates themselves are in a personal network through which information and resources can flow. As Craven and Wellman (1971) point out, "since density is a ratio measure, it should not be used alone without taking into account the size of the network. The two measures, size and density, together constitute the basis for investigating the structural properties of networks" (p. 7).

The combination of both criteria, has been studied by several researchers with conflicting findings and conclusions. Craven and Wellman (1971), for example, maintained that relatively dense networks are generally small, and loosely knit networks tend to be large. Puaw (1963) supported this proposition by noting that the relatively dense networks of migrant laborers in East London, South Africa, were composed of fewer units than the open networks of a town resident. Similarly, Sheingold (1973) found that some of his subjects were insulated from information because their netowrks were both small and closely knit. However, two studies of working class families, one in England (Young and Wilmot, 1957) and one in America (Gans, 1962) reported that closely knit networks dominated by kin were large.

Composition. Although size and density are important structural features in an individual's network, it is also frequently important to determine the types of links between people in the network. Fallding (1961) suggested that a crucial intervening variable affecting density is composition - - particularly the presence of kin (supported by Gluckman in his preface to Bott, 1971). In Fallding's view, kinship ties are distinctive because kin likely know each other, and the kinship region of the network is likely to be more closely knit; and the relationships are permanent. Bott (1971) also suggested that the effect of the size of an individual's network may be modified by several intervening variables such as the type of the problem or goal which requires the mobilization of assistance, the numbers of people available as resources in specific regions of the network (kinship, friends) and the existence of one or more "significant others" or confidants which should also be taken into account. Adams (1967) and Kadushin (1968), for example, have contributed the important idea that some of the basic properties of kinship are concern and obligation, aid mobilized for personal problems and ceremonies, while the basic property of friendship is consensus (shared interests) which are manifest in voluntary social activities. Similarly, Craven (1971) noted that the goal for which support is mobilized may be neutral (information) or affectively laden (need for sympathy or emotional support). These two types of goals would certain-

ly influence whether one went to a relative or stranger for help.

Summary

The immediate social environment of people consists of a network rather than an organized group. The distinction between "network" and "group" lies in the fact that in a group, a common boundary is agreed upon by all the members of a group. It is the agreement on a boundary that allows members of a group to know who is and who is not a member. It is a lack of a common boundary that is a hallmark of networks.

The previous brief review of literature on social networks sought to indicate that network analysis provides a perspective which has been used for precisely the kind of problem addressed in the present investigation about self-planned learning: how do self-learners get information and assistance, from what pool of resources, and in what way are the structural characteristics of that pool of resources associated with the resources obtained? The studies reviewed have suggested that several structural characteristics of social networks could be salient features in interpreting variations in the amount, source, and type of help self-learners obtain.

Substantively, then, the focus of the present research is on self-planned learning. Methodologically, however, this dissertation should be of relevance to researchers interested in network analysis. One of the limitations

of research on social networks has been the paucity of reported empirical findings which have resulted from the multivariate statistical analysis of network properties. Structural characteristics are often discussed singly or sequentially in a qualitative narrative. Writers often infer that two or more variables in combination are related to a specific behavior, but few have used available multivariate techniques to test hypothesized relationships or empirically develop a typology of network structure based on several measures. The present investigation suggests that cluster analysis may be a useful tool for the latter consideration.

Questions

The previous review of the literature has included, within the sections on self-planned learning and social networks, several questions which suggest an approach to the problem of adequately describing the relationship between structural characteristics of a self-learner's personal social network and the help received during self-planned learning. That approach includes first describing the self-planned learning and the social networks of a selected sample before assessing the association between the two. The questions asked within these three divisions of analysis are summarized below:

1. Description of self-planned learning. How prevelant is self-planned learning? What types of projects and what subjects are undertaken? How much assistance do

self-learners receive and from whom?

2. Description of the social networks. What is the size, density and composition of the personal social network of the self-learner? Can patterns of these structural characteristics be identified and described?

3. Assessment of the relationship between network properties and help received in self-planned learning. Are size, density, and composition (network properties), taken as a set, related to amount, source, and type of help, taken as a set? If types of networks exist, do self-learners within each type differ in the amount, source and type of assistance they receive? Which network properties are the best predictors of the amount, source, and type of help received?

CHAPTER III
METHOD

In the preceding chapters, the purpose was stated and the relevant literature was reviewed. This chapter presents the method used in operationalizing the variables, selecting the sample, collecting the data, and analyzing the data.

Initial Specification of the Variables

Dependent Variables

The dependent variables included the amount, source, and type of help received by learners for all their intentional self-planned learning efforts during the six months prior to the interview. The criteria used for establishing what was considered as a "self-planned learning project" followed the definition and parameters established by Tough (1967, 1971) which were described in the previous chapter.

Amount of help received. The amount of help received was measured by counting the total number of people who provided some information or assistance to the learner for his self-planned learning.

Type of help received. The type of help received was measured by counting the total number of people who provided help within each category of the 12 teaching tasks

described in the previous chapter. The 12 teaching tasks delineated a major decision or action for which help was sought by the self-learner.

Source of help received. The source of help received was measured by counting the number of people who supplied help in each category of the following classification of helpers: within the home of the learner, relatives, friends, experts who were friends, experts, and others. Inclusion of a helper to one of the six categories was made by the learner. In order to compare the relative importance of the six sources of help, the total number of helpers within each category was divided by the total number of helpers - - providing a measure of the proportion of the total amount of help which was obtained by each self-learner from each source of help.

Independent Variables

The independent variables included the size, density, and composition of the learner's personal social network. The personal social network was defined as those people with whom the self-learner had contact at least one time per month. "Contact" was defined as communication (oral or written).

Size. Size of the personal social network was measured by counting the total number of people in the network.

Density. Density of the personal social network is the extent to which members of the network are linked together. The concept of "linkage" was defined as whether

the members of the network knew or saw each other socially, as reported by the subject. Density is a ratio measure of the actual number of links between members of a network to the maximum possible number of links in the same network. It is presented in the form of a percentage.

Composition. The composition of the personal social network was measured by counting the number of people in the network who the subject identified as "relatives", "friends" or "others". The total number of people in each category was then divided by the size of the network. Composition of the network, then, is reported as the proportion of relatives, friends, and others in the personal social network.

Sample

The data on self-planned learning and social networks were collected in the Spring of 1974 from fifty adult self-learners residing in the Durham and Chapel Hill area. The sample was drawn from a list, obtained from three high schools, of white male non-college bound adults (ages 18 to 25) who had probably not attended any educational institution during the previous six months. Individuals included on the list had either dropped out of high school or had not had their transcripts forwarded to any educational institution during the previous five years. Six hundred and sixty-one names were obtained. The desired sample size was fifty. Consequently, 100 individuals were randomly selected from the total of 661 names. Eighty individuals

were approached before data were collected on the self-planned learning of fifty subjects. The interview rate was 80 percent - - 16 people could not be located or refused to be interviewed. Fourteen of the people who were willing to be interviewed had not conducted self-planned learning projects during the previous six months and the interview was terminated.

Instrumentation

The amount, source, and type of help received (the dependent variables) were measured using questionnaire items originally developed by Tough in 1965 and refined by him and others in 1971. Size, density, and composition of the self-learner's personal social network (the independent variables) were measured by using sociometric questions and open-ended interviewing developed on the basis of guidelines suggested by Mitchell (1969) and Bott (1971). The entire interview schedule is presented in Appendix I.

Collection of Data

Data were collected through an in-depth interview which lasted a total of from two to three hours and which often required several separate meetings with each subject. Interviews were conducted in the subject's home. A brief summary of the data collection procedures are included below.

The object of the interview was stated: to investigate how people learn on their own. Subjects were asked to

remember anything at all that they had attempted to learn on their own which met the following two criteria: (1) they had spent at least eight hours at the project during the previous six months; and (2) they themselves, rather than any professional teacher had assumed the primary responsibility for planning and controlling the project.

After the subjects had mentioned as many projects as they could, they were handed a sheet containing examples of learning projects to stimulate recall and further identify the range of topics which qualified as learning projects and which could be included in the study.

Subjects who had not undertaken any self-planned learning which met the criteria, were asked a brief series of questions about themselves and the interview was terminated.

Subjects who did mention one or more projects were asked a series of questions about each project in order to ensure that it did meet the criteria.

At this point in the interview questions were asked about the subjects' background. Following these questions, subjects were told that the interview involved making a map of the people they knew and saw at least one time each month. Responses to a series of questions, which delineated the size of the subject's personal social network, frequency of contact between the subject and members of the network, and linkage between members of the network were mapped.

After mapping the social networks, the interview returned to the learning projects which were previously mentioned by the subjects. Subjects were asked to list (by initials or other description) all the people who had had any contact at all with the project. After the subjects named as many as they could, they were handed a sheet with a list of types of people who may have provuded help to stimulate recall.

Attention was then shifted to the types of tasks which self-learners often have to undertake in their learning. The subjects were given a sheet which included a description of the following 12 teaching tasks:

1. deciding where to learn;
2. deciding how much money to spend;
3. deciding when to learn or for how long;
4. choosing the goal: deciding what knowledge or skill to learn;
5. deciding the specific activities, methods, resources, or equipment needed to achieve the goal;
6. setting specific deadlines, intermediate targets or goals - - setting the pace for learning;
7. estimating the current level of knowledge or skill, and progress toward the goal;
8. obtaining printed materials, equipment or other resources;
9. dealing with a lack of desire for achieving the goal;

10. dealing with doubts about success;
11. dealing with difficulty in grasping parts of subject matter;
12. deciding whether to continue learning.

The subjects were first asked if they had to deal with each of the 12 tasks. If so, they were asked to indicate who, on their list of helpers provided information or assistance in performing the task.

When the list of tasks was completed, subjects were asked if there were any other tasks or problems for which they received help, and if so who helped them accomplish these tasks. They were also asked if there was anyone on their list of helpers who had not been mentioned thus far, and what the nature of this person's contact with the project was. The interview was then terminated.

Pre-testing the Instrument

A pilot set of interviews were conducted with nine individuals who were not members of the study population. The instrument and data collection procedures employed were identical to those used with the study sample. The purpose of the pilot interviews was to allow the investigator the necessary practice which was required if the instrument was going to be used effectively and consistantly with the study sample. Although the instrument contained a series of specific questions taken from previous research, a considerable amount of open ended questioning, probing into the nature of the learning projects and the social networks,

was required. It became obvious that to elicit the data demanded by this study, the investigator had to become aware and remember a great deal of information during the course of the interview. It was not so much a problem of asking a specific set of questions, as asking the right questions which helped fill in the blanks between the items in the instrument.

The pilot interviews revealed that a great deal more data were being collected than would be needed in the analysis of the questions presented at the end of the previous chapter. The entire set of data collected, however, did provide a background and context which made later questions easier to ask. For example, asking the social history questions provided a context for the mapping of the networks; mapping the networks (and discussing the individuals in the network) provided a context for talking about the helpers for a particular self-planned project. Throughout the interview, information about projects and networks was checked and rechecked ensuring, to a certain degree their reliability. It would have been very easy for subjects to invent, or simply be mistaken about, specific numbers (of projects, helpers, hours spent, friends, etc.) if these data had been collected by asking a single question such as "How many people helped you with this project?" It appeared almost inconceivable that anyone could fabricate a ten or twenty minute description of learning activities, complete with the specific names of

helpers and occasions on which help was given; or the names and frequency of contact one had with relatives and friends.

Results of the pilot interviews also suggested that some of the major variables as initially formulated would have to be modified. This was accomplished by redefining the major variables under consideration, rather than devising additional measuring devices. The instrument, described above, remained unchanged and was employed with the study sample.

In its initial formulation, the type of help received by the self-learner was measured by counting the total number of people who provided help within each category of 12 teaching tasks. Responses to the series of questions concerning the teaching tasks, however, proved to be unsatisfactory for this approach. The subjects focused on the people who provided help rather than the tasks for which help was sought. They recalled specific individuals and the occasions which that individual provided help and were unwilling to talk about types of tasks for which several individuals may have provided assistance. It was possible, however, to make a distinction between people who were approached only once or twice (salesmen, librarians, a person who provided a bit of information, or equipment) and others who provided more sustained help, over a number of tasks. This dichotomy, which appeared to combine both the amount and quality of help received from a single

helper, was used as a measure of the type of help with the study sample.

Another problem was posed by the classification scheme which delineated the variable source of help. It became apparent during the pilot interviews that the six categories overlapped (i.e., a friend might live within the home of the learner; a relative might also be an expert). In order to avoid confusion, which was apparent during some of the pilot interviews, a simplified classification scheme was adopted which collapsed the six original categories of helpers into three mutually exclusive sources of help - - namely, relatives, friends, and others (who were not friends or relatives).

Finally, the definition of density (the extent to which people in the personal social network know or see each other socially) was not adequate. The problem with this definition was the fact that "to know" someone is quite different from "seeing them socially". A number of individuals in a learner's network, like parents or other relatives, might "know" other people in the network, but not see them socially, or even be particularly friendly with them. It was also possible for a person to know as many as 30 to 50 people at a job, but only a few of these individuals were considered of any importance to the subject -- fewer still were seen socially. Further, a number of people seen frequently at home and at work were not considered "as important" to the subject as other members

of his network. A distinction was made by the subjects between voluntary contact with and between individuals in a network, and contact (in the home, or at work) which was beyond the subjects' control.

Given these findings from the pilot interviews it appeared that the concept of the personal social network could be usefully divided into a network of individuals with whom the self-learner had contact with at least one time per month (the total personal social network) and a more intimate network of individuals with whom the self-learner maintained regular voluntary social interaction. The intimate social network is, in fact, a portion of the total personal social network. For purposes of comparison, the total personal social network may be termed the extended network of the self-learner. Both the extended and intimate networks were described by the structural characteristics of size, density, and composition.

Reformulation of the Variables

Dependent Variables

The dependent variables in their final form included six measures related to the amount, source, and type of help received by the self-learner. Shortened labels for the variables, as used in subsequent chapters, are presented in parentheses.

Amount of help received

1. The number of helpers (#HELPERS).

Source of help received

2. The proportion of the helpers who were relatives (%HELPERS-R);
3. The proportion of the helpers who were friends (%HELPERS-F);
4. The proportion of the helpers who were others, not relatives or friends (%HELPERS-O).

Type of help received

5. The number of helpers who provided help only once or twice (# HELPO);
6. The number of helpers who provided help three times or more (#HELPMO).

Independent Variables

The independent variables in their final form included ten measures related to the size, density, and composition of the extended and intimate networks of the self-learners. The extended network was defined as all of the people with whom the self-learner had communication (oral or written) at least one time per month. The intimate network was defined as all of the people in the extended network with whom the self-learner maintained regular voluntary social interaction.

Measures on the extended network included:

Size.

1. The number of people in the extended network (SIZE1).

Density.

2. The extent to which individuals in the extended network knew each other (DENSITY1).

Composition.

3. The proportion of the extended network who were relatives (%RELATIVES [1]);
4. The proportion of the extended network who were friends (%FRIENDS [1]);
5. The proportion of the extended network who were others, not relatives or friends (%OTHERS [1]).

Measures on the intimate network included:

Size.

6. The number of people in the intimate network (SIZE2).

Density.

7. The extend to which individuals in the intimate network saw each other socially or maintained voluntary contact (DENSITY2).

Composition.

8. The proportion of the intimate network who were relatives (%RELATIVES [2]);
9. The proportion of the intimate network who were friends (%FRIENDS [2]);
10. The proportion of the intimate network who were others, not relatives of friends (%OTHERS [2]).

Analysis of Data

The data collected were comprised of two sets of variables: multiple dependent variables (amount, source, and type of help) and multiple independent variables (size, density, and composition of the extended and intimate networks). Data analysis consisted of three phases: first, a description of the extend of self-planned learning; second, a description of the social networks of the self-learners; and finally, an assessment of the relationship between the structural characteristics of the social networks and the help received in self-planned learning.

Extent of self-planned learning

Standard descriptive statistics were used to summarize the self-planned learning activity of the entire sample. Although emphasis in this phase of the analysis was on the amount, source and type of assistance the subjects received while conducting their self-planned learning projects, additional descriptive information was generated on the number of types of projects undertaken.

Social networks

The social networks of the total sample of 50 individuals were drawn and mapped during the interview. The map was, quite simply, a picture of the social network, with points on the page representing the units and the lines between the points representing links. Figure 1 is a graphic representation of a simplified hypothetical social network of five individuals.

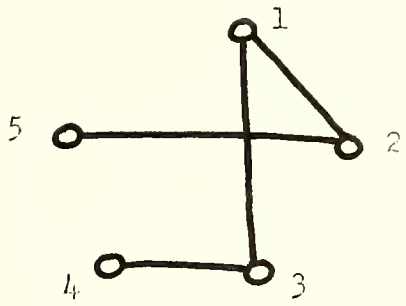

Figure 1: Hypothetical network of five individuals.

While maps are useful visual representations of networks, matrix representations are more useful for mathematical analysis, particularly in the computation of the measure "density" (Flament, 1963; Harary, Norman, & Cartwright, 1965). The network for Figure 1 can be represented by a matrix of five rows and five columns - - one row and one column corresponding to each member of the network. The presence or absence of links between members can be indicated by place a 1 or a 0 respectively in the appropriate cell of the matrix. The diagonal cells, representing the relationships of individuals to themselves, remain empty. Using this method, the matrix representation of the network should look like Figure 2.

	1	2	3	4	5	
1		1	1	0	0	2
2	1		0	0	1	2
3	1	1		1	0	3
4	0	0	1		0	1
5	0	1	0	0		1
						9

Figure 2. Matrix representation of Figure 1.

The total number of non-diagonal cells in the matrix is the number of possible linkages between the units. This quantity can be arrived at by the formula (n[n-1]) where n is the number of units. The sum of all the '1s' in the adjacency matrix is the actual number of links in the network. Using these two quantities, we can derive a "density" measure of the extent to which units in the network are linked to one another. This is the simplest form of a family of measures known as 'knit', 'density', 'mesh', etc. which represent the relative proliferation of interactional ties among the members of the net. The formula (100a/p), where 'a' is the actual number of links and 'p' is the maximum possible number of links, gives the density of the network in the form of a percentage (Barnes, 1969; Bott, 1971; Craven & Wellman, 1971). The density for the hypothetical network represented by the graph (Figure 1) and

matrix (Figure 2) above would be:

$p = m\ (n-1) \qquad p = 5\ (5-1) = 20 \qquad a = 9$

Density = $100a/p = 100\ (9)\ /\ 20 =$ <u>45.0%</u>

The major problem of description for this phase of analysis was to see if the social networks, as measured by the ten structural characteristics (the independent variables), could be classified into distinct groups. Stated another way, given a collection of fifty individuals on each of which are observed the values of 10 network properties, do the individuals appear to cluster into groups, or do they present the appearance of a homogeneous chaos? For the solution to the problem of identifying similar patterns on the network properties, cluster analysis was used. The following detailed description of the cluster analysis employed in the present investigation is provided because this statistical technique has been so infrequently used in research and social networks.

Clustering analysis is the last step in the progression of category sorting problems. In <u>classification analysis</u> the category structure is known, while in <u>discriminant</u> analysis only part of the structure is known and missing information is estimated from labeled samples. The operational objective in both these instances is to classify new observations, that is to recognize them as members of one category or another. In <u>cluster analysis</u> little or nothing is known about the category structure. All that is available is a collection of observations whose category

memberships are unknown. The operational objective in this case is to discover a category structure which fits the observations.

In a typical example, one has a sample of data units (e.g., the 50 subjects in the present investigation) each described by scores on selected variables (10 network properties). The objective is to group the data units into clusters such that the elements within a cluster have a high degree of "natural association" among themselves while the clusters are "relatively distinct" from one another (Anderberg, 1974). The approach to the problem and the results achieved depend principally on how the investigator chooses to give operational meaning to the phrases "natural association" and "relatively distinct". Unfortunately, the selection of an appropriate measure is the subject of some controversy among statisticians. Consequently, a clustering technique (NORMIX) which did not rely upon arbitrary assumptions about similarity was first employed (Scott & Symons, 1971; Symons, 1973; Wolfe, 1970).

The NORMIX program, developed by Wolfe (1970) views clustering as a classical goodness of fit problem, using an approach of maximum-likelihood estimation. This program assumes a model for the data of a mixture of multivariate distributions and then tests the fit of thismodel to the data. The sampled population is thought to be composed of several distinct sub-populations and the intent is to group

together all those observations belonging to the same sub-population. The statistical structure supposes that each observation arises from one of a small number of different distributions, one modeling each sub-population. The probability of an observation coming from a particular component is taken as the proportion of the population in the corresponding sub-population. A cluster is defined as those observations coming from the same component distribution in the mixture. The problem is formulated as one of estimating the component origin of each observation by using maximum likelihood methods.

The method of maximum likelihood is a means for generating estimates about the population from which a sample of units were drawn; supplying observations on one or more variables. Maximum likelihood estimates are not available until the data are obtained. Maximum likelihood estimation does not utilize probabilities associated with possible hypotheses, it is an estimate of the most probable value for the population mean (in a univariate analysis) or centroid (in multivariate analysis) after the data are obtained if each value of the population mean or centroid were equally likely before the data were obtained (as would be the case if the sample were randomly selected).

The NORMIX program requires an initial set of clusters for the data units in order to start the main clustering method which maximizes the likelihood function. The initial set of clusters is established through hierarchical

grouping (Ward, 1963). Ward's heirarchical clustering method is based on within group variance. Starting with n observations, the method begins with n groups, each group consisting of one observation in the univariate case. At this stage the within group sum of squared deviations (W) equals zero. Then, at each stage the number of groups is reduced by one by merging those two groups whose combination gives the least possible increase in W. This process is continued for a total of n minus 1 mergers until there is only one group.

In the multivatiate case, cluster centers (centroids) are computed by averaging the values over the p variables for the observations in each cluster. The cluster centers are denoted by $\bar{X}$ and the overall data matrix as X. The total sums-of-squares- and cross-products matrix (SSCP matrix), denoted by T, may be split into within clusters (W) and between clusters (B) matrices.

Unless initial estimates (means, standard deviations, or correlations are supplied by the user for a particular number of clusters, NORMIX uses the initial estimates generated by the hierarchical grouping for the maximum likelihood equations.

The hierarchical grouping phase not only generates the initial estimates for the clusters, it also supplies the weights (discriminant functions) to apply to the raw scores. The weights applied to the variables determine the probabilities of cluster membership (for any one

individual) and these probabilities determine the likelihood ratio. During the next iterative phase of the NORMIX program, the weights applied to the variables are revised so as to produce better discrimination between groups. These revised weights change the probabilities of cluster membership, which in turn either maximize the likelihood ratio or they do not. The NORMIX procedure continues the iterative process until the maximum likelihood parameter estimates are determined.

Likelihood ratio tests are used in the iterative process to test alternative hypotheses concerning the forms of the component distributions. The best solution for any specified number of clusters is the one with the greatest likelihood.

Likelihood ratio tests may also be used to test between the number of clusters. The number of clusters, $\underline{r}$, is only a hypothesis which can be tested against an alternative hypothesis of $\underline{r}'$ clusters by finding maximum likelihood estimates under both hypotheses and testing the likelihood ratio with an approximate chi square test. Wolfe and others have noted that the approximate chi square test is often inaccurate with small samples, and further refinement is needed. Consequently, the chi square test supplied by the NORMIX program which indicates the significance of the 1 vs the 2 cluster solution, or 2 vs 3 cluster solutions, etc., is treated with caution. Given

a series of from 1 to x clusters, the best solution is that point (or cluster) where the log likelihood tends to increase (or maximize) only moderately, indicating that additional clusters do not substantially improve the likelihood estimates.

Wolfe (1970) notes that the final cluster solution depends to a large extent on the initial estimates, and further that a multiplicity of different solutions are possible. Although the NORMIX program generates the initial estimates by the Ward hierarchical method, a recent article by Symons (1973), suggests that initial estimates might be best determined by using a cluster program developed by McRae (1970): the Multivariate Iterative K-means Cluster Analysis (MIKCA).

The general problem then the MIKCA program attempts to solve is that of partitioning a set of multivariate observations into disjoint clusters of observations that are in some sense dissimilar from one another. This is done by optimizing in an iterative improvement fashion one of several potential objective criteria. One frequently used criterion in cluster analysis has been the minimization of the sum of the squared deviations of the observations from their cluster centers. Cluster solutions of this type (the Ward method is an example) have been called "minimum Trace W" solution. This criterion is one of the several available in the MIKCA program.

Another commonly used criterion is the determinant of

the within clusters SSCP matrix ($|W|$). This criterion uses a likelihood ratio test based on Wilk's Lambda statistic where

$$\text{Lambda} = |W|/|T|$$

A small value for Lambda indicates good discrimination among groups, and since $|T|$ is a constant, optimizing this criterion in the cluster analysis case is equivalent to minimizing the $|W|$.

The following brief description of the MIKCA procedures is taken from a paper by McRae (1970):

> The information specified by the user includes, in addition to the number of observations and the number of variables, an estimate for the number of clusters and a specification of the criterion to be used. Initial cluster centers are determined by randomly choosing an observation to serve as the initial center for each cluster. All observations are then assigned to the cluster having the closest center, with the cluster centers being recomputed after each observation is assigned. The order of consideration of the observations is the order of input. After all observations are assigned, the criterion value is computed. This entire procedure is repeated 10 times. The solution associated with the best criterion value of the 10 is chosen as the initial cluster solution.

After the initial solution is found, the iterative K-means procedure begins. Once again each observation is considered in the order of input. The observation is assigned to the cluster having the closest cluster center. After each observation has been assigned, the cluster centers are recomputed. For any given iteration, after all the observations have been considered, the criterion value is computed; if the criterion value is better than the previous iterations, the entire process is repeated; if the criterion value is the same or worse, the program continues on to the individual switches heuristic.

The individual switches heuristic assigns observations to clusters based directly on the criterion value. In addition, the order of consideration of the observations differs from the K-means section of the program. Briefly, this heuristic begins by considering observations in cluster "one". It considers switching each observation in this cluster to each of the remaining clusters; the switch is made if and only if the criterion value improves when the switch is made. After all observations in cluster "one" are considered, the observations in cluster "two" are considered, and so on.

The individual switches heuristic is intended

> to be a final sharpening process. If any switches are made then the heuristic will continue to consider those clusters affected by the switches until no further switches are made. At this point, the final cluster solution is output. (p. 6-7).

Inherent in clustering criteria, like the trace and determinant of the within groups sums of squares matrix, is the tendency to split the data set into approximately equal sized groups regardless of the underlying proportion of mix, unless the groups are widely separated. Symons (1973) derived additional criteria using a Bayesian approach which are more sensitive to disparate group sizes. These criteria were incorporated into the MIKCA program. Results using data and clusters of known sizes (the Fischer Iris data), employing the Bayes criterion and comparing it to the maximum likelihood approach of Wolfe (1970), suggested that:

> the solution using the Bayes criterion will provide useful initial parameter estimates for maximum likelihood routines with mixtures of multivariate normals, especially when the sample size is not large (Symons, 1973, p. 1).

Consequently, the following general clustering procedure was adopted in this study. Data on the network variables was entered into the MIKCA program using the determinant W and Bayes criterion. From 1 to 6 clusters

were specified. Criterion values were graphed in order to determine the number of clusters at which the criterion value ceased to be substantially improved. Initial estimates from these solutions were then entered in the NORMIX program. Log likelihood estimates for 1 to 6 clusters were graphed and a final cluster solution for the data selected.[1]

Both clustering techniques described above involve complex matrix manipulation of the multivariate SSCP matrix. The SSCP matrix becomes singular (equal to zero) if there are ipsative measures (a set of variables such that the total score is the same for every individual). Since the two sets of scores comprising the composition of the extended and intimate network were ipsative (%RELATIVES + %FRIENDS + %OTHERS = 1) a transformation of these variables was required. The transformation adopted was through principal components analysis.

A principal components analysis of p original variables results in p principal components which reproduce the correlations between the variates exactly except that the vectors of these principal components are uncorrelated (orthogonal). When principal components analysis is employed, scores on the components can be calculated; and

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[1]The author wishes to acknowledge the assistance of Dr. K.J.C. Smith (Statistics Department, UNC-CH), Dr. M.J. Symons, (Biostatistics Department, UNC-CH), and Dr. Kerry L. Lee (Duke University) in selecting both the analytical approach, the specific computer programs used, and interpretation of the output of the cluster analysis.

a reciprocal relationship exists between them and the scores on the observed variates (Lawley & Maxwell, 1971; Tatsuoka, 1971).

A principal components analysis was performed on the two sets of variables (composition: three variables each), using the SOUPAC (1973) program. Resulting principal components each contained a vector (or weight applied to the original variables) composed of three eigenvalues, a 3 by 3 matrix. This matrix was multiplied with the matrix of the original data for all fifty subjects (a 50 by 3 matrix). The result was three transformed scores for the composition variables in the extended and intimate network. These transformed scores, which were orthogonal, were used in the clustering program.

As a preliminary to the final analysis, the scores comprising the network profile for each subject were entered into the NORMIX program. The results, though suggestive, demanded further refinement. Consequently, the 8 network variables were entered into the MIKCA program. A cluster solution for from 1 to 6 clusters, using the determinant W and Bayes modification of determinant W, was analyzed. Criterion values for these solutions were graphed in order to determine the "best cluster solution" for the data. Initial estimates forthe mean scores on each of the variables, and the proportion of the subjects in each group (of the solution accepted as "best") were then entered into the NORMIX clustering procedure.. A final solution

was accepted as the most plausible description of the data and used in subsequent analysis.

Profiles on the 10 network variables were constructed for each cluster in the following manner:

1. Means, standard deviations and distributions for all ten original network variables were computed for each cluster (the transformed composition measures used in the cluster analysis, resulting from principal component analysis, were re-converted to their original form (percentages)).
2. Means, standard deviations, and distributions for all ten original network variables were computed for each cluster.
3. Raw scores for the ten network variables were transformed into standardized scores (with a Mean of 50 and SD of 10) to aid in comparison of the clusters.

Social Networks and Self-planned Learning

The goals in the final phase of analysis were threefold:

1. to assess the degree of association between the two sets of dependent and independent variables;
2. to see if the analysis indicated whether the subjects within the clusters of networks differed in the amount, source, and type of help they received; and

3. to assess the relative importance of the network characteristics in predicting the amount, source and type of help received.

Canonical correlation analysis was used to assess the degree of association between the two sets of variables. Canonical correlation analysis is used to find out what relationship exists between a pattern of one set of variables (network characteristics) and a pattern of another set (the helping variables). The basic strategy of canonical correlation is to derive a linear combination from each of the sets of variables in such a way that the correlation between the two sets is maximized.

The computer program used for canonical analysis was contained within the Statistical Package for the Social Sciences (1974). The input to this program were the two sets of variables: network properties and helping measures. Output of the program was in the form of pairs of canonical variates. Canonical variates are composed of coefficients that reflect the relative contribution of the original variables in composing the canonical variates for each set of variables. The amount of correlation between the pairs of variates is the canonical correlation, its square represents the amount of variance in one canonical variate that is accounted for by the other canonical variate. Canonical correlations are the multivariate equivalent to the simple product-moment (Pearson) correlation coefficient. Because of the problem of ipsative

measures and linear dependency for both sets of variables, two canonical correlation runs were employed using the transformed composition scores of the network variables.

Multivariate analysis of variance (MANOVA) was used to test the hypothesis of no difference between clusters on the helping variables (Applebaum, 1974; Cramer, 1974). Again, since some of the dependent variables (measures of help) were ipsative, two sets of MANOVA analysis were performed and reported. No specific hypotheses of differences between groups were specified. Given a significant multiple F and significant univariate F tests, it was the intent of the investigator to proceed with appropriate multiple comparison procedures.

Finally, at the outset of the analyses, it was apparent that one possible outcome of the two analyses described above was a significant correlation between the two sets of variables but no significant differences between clusters on the helping variables. Though the clustered networks were an accurate description of the data for the sample, in a diagnostic sense, it was possible that all the structural characteristics taken together in a set might be of little practical importance in delineating differences on the criterion variables. In order to allow for such a contingency, and to be better able to explain such a finding, a stepwise multiple regression analysis was planned which would assess the relative importance of the network variables for each of the helping measures.

Findings from the implementation of the procedures described for gathering and analyzing the data are reported in Chapter IV.

CHAPTER IV

RESULTS

Chapter IV reports and discusses the findings in three sections. The first section describing the extent of self-planned learning emphasizes the findings related to the dependent variables (the amount, source, and type of help received). The second section on social networks reports the results of the clustering procedures, emphasizing variations in the structural characteristics (size, density, and composition) of the self-learner's intimate and extended network. The third section assesses the relationship between the structural characteristics of the networks and the help received in self-planned learning.

I. Self-planned Learning

Of the 64 individuals interviewed, 77 percent (or 50) indicated that they had undertaken some form of self-planned learning during the six months prior to the interview. The fifty subjects had conducted 114 separate learning projects, an average of 2.28 per subject, with some subjects undertaking as many as five separate projects during the previous six months. Table 1 summarizes the distribution of the number of projects performed by each subject.

TABLE 1

Number of Projects Performed by Each Subject

#Projects	#Subjects
1	14
2	17
3	14
4	1
5	4

Mean = 2.28 Median = 2.15 SD = 1.14

Types of Projects

Previous studies on learning projects have described the extent of self-planned learning in two ways: reporting the number of projects undertaken; and estimating the number of hours spent at each project. During the interview, a number of subjects found it difficult to estimate the number of hours they had spent at each project. Descriptions of the projects, in conjunction with the subject's rough estimates of the total time spent, did suggest a classification scheme which was based on the amount of effort with which the project was pursued, its importance to the learner, and where the learning took place. Consequently, all projects reported in the interview were categorized as being (1) minor projects; (2) major projects; or (3) work projects. Definitions and descriptions of these types of projects are included below.

Minor Projects. This category included those projects which while meeting the definition of self-planned learning were of minor importance to the learner and for the most part exemplified an unorganized approach to learning. Although the individual may certainly have learned somethink in a minor project, there was some question as to whether it was of much value in his everyday life. Goals were not clear and often did not exist. Some examples of the subject matter for these minor projects are included below:

1. Nature, gardening, growing houseplants.
2. Motorcycles and cars. Several subjects indicated that they were interested in, and had spent time learning about, motorcycle racing and jumping. Others had repaired their motorcycles or cars when minor problems had come up.
3. Music. Several subjects practiced guitar and wanted to start a band. Two subjects said they wrote, or thought of songs, every so often.
4. Hobbies and crafts. Topics like ceramics, model building, collecting coins, skeet-shooting, collecting arrowheads, canoeing, cards, making candles, repairing chairs, taking photographs, breeding tropical fish and drawing cartoons were taken up, briefly learned about, completed, and for the most part soon forgotten or given only the lowest priority by the learner.

5. Responses to life experiences. Subjects read, talked about, and "tried to learn more about" such things as psychology, interpersonal relations, self-actualization, the quality of friendships, world religions (transcendental meditation), personal religion (moral behavior), astronomy and flying saucers, and drugs.

6. An intense interest in some particular problem, topic, or person. These interests were pursued quite diligently for a short time and then dropped. Examples included studying (or reading or talking about) Thomas Jefferson, Carlos Castenada, exorcism, a praying mantis, tracking national weather by radio, learning to pitch a softball (after playing another position) and coaching a church basketball team.

Minor projects are by no means a trivial waste of time, although learning about them is not exactly the pursuit of the "higher things" one associates with university education. To some extent they make up the stuff and fabric of what nearly all humans do to pass the time. The topics are not so very different from the major projects described next - - the main difference is in the energy with which the learner persued the topic, and the results which issued from the learning effort.

Major Projects. These projects were of great importance to the learner, had definite goals and sustained planning.

For the most part the major projects had been going on for some time (before six months prior to the interview), were ongoing, and took up to 40 hours of the learner's time each week. Major projects had a certain continuity of purpose, directed by the self-learner. The minor projects on the other hand often began and ended in fits and starts. Some examples of the subject areas for the major projects are as follows:

1. One of the more important categories for major projects had to do with the subject's career goals. Often subjects were working at one job to make a living, but undertook serious self-planned learning projects so that they could eventually become professional photographers, architects, radio broadcasters, motorcycle racing mechanics, pastors, songwriters, radio-electricians, and policemen.

2. Closely connected with career plans were another set of major projects which emphasized improving one's way of life. Two subjects who wished to become pastors were making major reassessments of their personal moral life. Another was equally intense about the study of Kung Fu - - as physical exercise (science or martial art) and as a philosophy of life. Another, who had had serious drug problems, and was currently working as a counselor at a Volunteer help center, was

engaged in assessing his own self-awareness, psychology of self and others, and various therapy techniques.

3. A very large number of major projects were initiated for practical reasons: to acquire knowledge and skills related to a particular job, sport, hobby, or interest. One subject started, owned, and operated a record store. Another had recently undertaken running a 200 acre farm and in addition was building a house. Several projects involved automobile mechanics: one subject completely overhauled an engine he previously knew nothing about; another build a car from the bottom up, acquiring the hull of a body which he repainted, buying a broken engine which he overhauled and installed; a third was studying to be a Formula I race car mechanic. Concerning hobbies and sports: subjects were involved in parachuting, flying, bicycles (repair and racing), developing a community recreation program, T.V. electronics, ham radio equipment, and gambling.

Work Projects. Work projects as defined in this study, were directly related to the job that the subject went to each day. Although not a part of the definition of this type of project, learning in the work projects often depended upon the initiative of a supervisor and occasionally took place only while on the job. In this respect,

the work projects resembled the learning which goes on in many schools, where the planning, goals, and details of the project are controlled not by the learner, but by a teacher.

A great many of the work projects were conducted by subjects who were registered apprentices as electricians, carpenters, telephone repairmen, and sheet metal workers. Others were learning skills on the job as parts manager of an automobile supply business, restaurant manager, assistant managers at department, grocery, and dry cleaning stores, propriator of a rest home, and as landscapper. One subject had turned a high school hobby into a full fledged business: glassblowing scientific instruments.

Comparison of Project Types. As previously noted, the topics studied in both the minor and major projects are quite similar. Aside from the fact that a great deal more time was spent on the major projects, the character of the two projects were also different as the following parallel examples, taken from the data collected, demonstrate.

Topic: Music

Minor Project	Major Project
Subject just picked up the guitar on his own; plays around on the guitar and writes a few lyrics every so often.	Being interested in song-writing and musical scores for 6 years, the subject studied theory, harmony, drama, and current Broadway models. Has written songs

and a senario for a musical comedy which he submitted to a school in dramatic arts. He was admitted though he has no high school diploma

Subject is trying to start a band with a group of friends but no one has the time.

Subject has played guitar, piano and drams for several years though he never took professional lessons. Writes music and lyrics which he sings himself. Set up his own recording studio, made tapes, redubbed his own voice over instruments and sent the tape to a recording company. Belongs to a band which works weekends.

Topic: Gardening

Minor Project

Subject currently has a keen interest in growing house plants and tomatoes and has learned "a lot".

Major Project

After racing motocycles for several years, the subject came home to run a 200 acre farm. Has had to learn farm management, crop rotation, proportion of farm in which money crops, raising

livestock. Learns from "self-experience", reading, asking neighbors; asks vetinarian questions whenever he comes to treat animals. Repairs all equipment on the farm. Subject plans to run the farm for the rest of his life.

Topic: Automobiles

Minor Project

Subject fiddles around with cars and motorcycles - - makes minor repairs, and learned how to put in new brake linings.

Major Project

Subject completely built a car from scratch: bought body, repaired and painted it, traded for an engine which he previously knew nothing about, overhauled the engine and installed it.

Topic: Personal Awareness

Minor Project

Subject became interested in transcendental meditation; read a few books, and talks to friends about it.

Major Project

Subject is committed to learning both the physical and philosophical aspects of Kung Fu. Reads, studies, and practices three times a day; built his own equipment to start his own classes.

> As seriously committed to Kung Fu as a way of life as the several other subjects interviewed who were studiously preparing themselves for the ministry.

These examples of minor and major projects are not atypical: the difference between the two categories was usually very easy to identify even when the topic was the same. There is a similarity between those major projects which involve career goals and the work projects. The difference between these two types was that in the major projects the subject may not have been employed at all, and career goals were pursued outside of supervised work.

The difference between minor and work projects, aside from the fact that more time was spent on the latter, may be seen by examining the minor projects involving hobbies such as making candles or taking pictures. In the work projects, the hobby becomes a profession: one subject turned a high school interest into a business - - glass-blowing scientific instruments; another intended to become a professional photographer and developed film in his own darkroom, learned about color processing, and has his photographs criticized by a recognized expert.

Of the 114 separate learning projects conducted by the 50 subjects:

46 (40.4 percent) were minor projects conducted by 28 subjects (44 percent of the 64 interviewed);

44 (38 percent) were major projects conducted by 34 subjects (53 percent of 64 interviewed); and

24 (27.1 percent) were work projects conducted by 23 subjects (36 percent of 64 interviewed).

It should be noted that while only 38 percent of all the projects were categorized as "major projects", some of the subjects undertook more than one learning project. Of the 50 subjects who indicated some type of self-planned learning, 34 (or 68 percent of the 50 self-learnerd) conducted at least one major project in the last six months. However, even if minor and work projects were removed from the analysis (as self-planned learning projects of debatable quality), a major amount of self-planned learning remains.

The three categories minor, major, and work projects emerged from the data as a logical and apparently important dimension which could be associated with the amount, source, and type of resources used by the subjects in their self-planned learning. Although not the original focus of the study, it appeared possible that the type of project was a dimension which could confound any findings related to the relationship between network variables and the amount and type of help obtained by the self-learners. A tentative analysis of these conjectures is presented in Appendix II.

Help Received

When a self-learner experiences some difficulties or wants some advice, he may seek assistance from one or more persons. They can assist the learner by making suggestions, providing encouragement, or helping the learner obtain materials, equipment, or other resources. In general, the fifty self-learners of this study obtained a very large amount of assistance. They reported that 514 people provided help for their 114 projects (an average of 10.3 helpers per person, with a range of from 1 to 25 helpers).[2]

Table 2 breaks down the total number of helping transactions by the source and type of help received.

Overall, Table 2 shows that friends provided the most help (43.2 percent) followed closely by others. A large majority of the helping transactions (327, 63.8 percent) were sustained helping relationships (HELPMO) and over half of these transactions were with the friends of the learners. Others provided half (52 percent) of the less sustained assistance (HELPO), with friends and relatives providing almost equal shares of the remaining transactions.

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[2]The figure 514 represents the total number of people the learners had transactions with over all 114 projects. Since some learners conducted more than one project, and since some helpers provided assistance for more than one project, the actual total number of people (helpers) was 473. The total number of transactions (514) will be used in this analysis to the extent of self-planned learning over the 114 projects. In section three, where the emphasis is on the sample of 50 subjects, the analysis will use the actual number of people (473).

TABLE 2

Frequency of Helping Transactions by Source and Type of Help

			Source of Help				
			Relatives	Friends	Others	Total Transactions	% of Total
Type of Help	HELPO	Transactions	47	43	97	187	36.2%
		% of HELPO	25.1%	22.9%	51.9%		
	HELPMO	Transactions	58	179	90	327	63.8%
		% of HELPMO	17.7%	54.7%	27.5%		
	Total Transactions		105	222	187	514	
	% of Total		20.4%	43.2%	36.4%		

TABLE 3

Frequency of Helping Transactions by Detailed Source and Type of Help

			Source of Help							
			Home	Relatives	Friends	Expert Friends	Experts	Others	Total Transactions	% of Total
Type of Help	HELPO	Transactions	24	23	36	7	30	67	187	36.2%
		% of HELPO	12.8%	12.3%	19.3%	3.7%	16.0%	35.8%		
	HELPMO	Transactions	38	20	85	94	71	19	327	63.8%
		% of HELPMO	11.6%	6.1%	26.0%	28.7%	21.8%	5.8%		
Total Transactions			62	43	121	101	101	86	514	
% of Total			12.1%	8.9%	23.5%	19.6%	19.6%	16.7%		

Table 3 provides a more detailed breakdown on the types of people involved in the helping transactions. For the purpose of this analysis each helper was classified as one of the following types: from within the home of the learner, relatives, friends, expert-friends, expert, and others. As noted in the previous chapter, these categories overlap, a fact which many of the subjects found confusing. The data, therefore, should be treated with caution. It is presented for heuristic purposes only.

Table 3 indicates that in terms of the total number of helping transactions, relatives outside the household of the self-learner are the least used source of assistance (8.9 percent). Help was most frequently obtained from friends (23.5 percent), expert-friends (19.6 percent) and experts (19.6 percent). The residual category others was the most frequently used source of help provided once or twice (HELPO), but for sustained assistance (HELPMO), three sources of helpers dominated the transactions; those with expert-friends (28.7 percent), friends (26.0 percent) and experts (21.7 percent). Although the general category friends appeared to be the greatest source of help in Table 2, it appears from the data presented in Table 3 that for sustained help, learners relied heavily on experts (either friends or others): 39.2 percent of all the helping transactions were with experts of some sort; and over half of the more sustained help came from experts.

The assistants shown in Table 3 can be divided up into those with whom the learner probably had some personal relationship and those who were approached primarily on a business or professional basis (others). According to this classification, 64.1 percent of all the helping transactions were with individuals approached on a personal basis.

Table 4 shows the number of sources of help used by each subject.

TABLE 4

Number of Sources of Help Used by Each Subject

Number of Sources	Number of Subjects
1	1
2	7
3	18
4	12
5	10
6	2

Mean number of sources = 3.6 Median = 3

The majority of the subjects used three, four or five types of helpers. One subject, for example, might have obtained assistance from a spouse, two close friends, an expert friend, and two salesmen. More detailed examples of the types of helpers used for various self-planned pro-

jects will br presented in the third section of this chapter.

Discussion. It was somewhat surprising to find that in this sample of self-learners, the majority of the helping transactions were of the sustained type(#HELPMO). On the one one hand, it would seem that self-learners are far less autonomous than might have been imagined. A completely self-sufficient learner, might well run into problems obtaining materials, or have questions regarding technical details, but these problems could be dealt with by simply asking a stranger (such as a salesman or expert) a simple question. This does in fact happen (51.9 percent of the type HELPO came from others), but the data also indicate that self-learners either need or want more sustained help; in any case they both seek it and receive it. Most of the sustained help came from friends, suggesting that either through a shared interest the learner and the helper became friends, or that sustained help is easier to obtain from someone who is not a stranger.

The finding that relatives outside the learner's household are the least used source of help may be explained in part because kinship ties are often activated only for certain types of problems and in certain types of situations - - apparently not to learn things or gain information concerning learning projects. It is also possible that the de-emphasis upon relatives as resources may be in part a function of the age and life-style of the subject.

At this time in their life, friendship ties are more important than kinship ties, at least insofar as social interaction and shared interests. This is also suggested by Table 2, which indicated that a greater proportion of the help sought and obtained came from friends.

The extensive use of experts (as defined by the learner) as sources of help is additional confirmation of the fact that these learning projects are quite important and the young adults who conducted them were quite serious about what they were doing. One might have suspected that the reason these subjects were not going to school was that they were simply not interested in learning anything. However, the number of projects undertaken, in addition to the emphasis placed upon expert help, suggests that this is false. The impression gained from the interviews is that the young adults in this study did not like the way learning was organized in schools: both the required course of study and the enforced expert help. The projects undertaken by the subjects in this study were frequently topics which are not emphasized in their secondary educational experience; English, math, and history were not among them. In contrast to the somewhat impersonal professional expert help provided in most highschools, self-learners sought and received help from individuals with whom they had some personal bond.

II. Social Networks

Taken as a unit, the extended network of the sample of fifty self-learners consisted of a total of 1409 people, an average of 28.18 people for each subject, with a range of from 7 to 57 people. The average density of the extended network was 46.03 (nearly half of the potential links between people in the network were actualized). The range of the density measures for the extended networks varied from 26 percent (one fourth of the links actualized) to 100 percent (everyone on the network knew everyone else). The average extended network consisted of 43 percent friends, and an equal proportion of relatives and others (approximately 28 percent each). Although the range of the composition measures in the extended networks was quite great, with some subjects reporting no relatives, others no friends, and others no others, when these networks were trichotomized on the basis of size, there was no difference between the average number of relatives in the three groups. This suggests that the total size of the extended network was not dependent upon the number of relatives. The major determinant of size differences in the extended network was due to the categories "friends" and "others".

The smaller intimate network of the self-learners, consisted of a total of 1047 people, an average of 21 people per subject, with a range of from 3 to 55 people. As expected the density of the intimate network was higher

than the extended network (53 percent) and the proportion of friends in the network was higher (61 percent). The proportion of relatives dropped slightly to 25 percent and the proportion of people considered "others" even more to 14 percent. It is interesting to note that the total number of friends in the intimate network remained approximately the same as the number of friends in the extended network. Consequently, the reduction in the size of the intimate network was due entirely to a reduction in the number of individuals in the categories "relatives" and "others".

Cluster Analysis

Prior to the clustering procedures a Principal Components analysis was used to transform the two sets of composition variables for the extended and intimate networks. Tables 5 and 6 show the results of the Principal Components analysis for the composition variables associated with the extended network (%RELATIVES (1), %FRIENDS (1), and %OTHERS (1)). Two prinicpal components for the first set of composition variables (for SIZE 1) explained over 99 percent of the variance in the original three measures. Each component contained a vector (or weight applied to the original variables) composed of three eigenvalues, a 3 by 3 matrix. This matrix was multiplied with the matrix of the original data for all fifty subjects (a 50 by 3 matrix). The result was three transformed scores for the composition variables in the SIZE 1 network. Since the first two

TABLE 5

Principal Components of Composition Variables in the Extended Social Network

Principal Component	Eigenvalues	Percent Variance Explained by P.C.	Cumulative Variance Explained
1.	886.8317	60.51	60.51
2.	578.5477	39.4725	99.98
3.	0.3175	0.0217	100.00

TABLE 6

Columns of Eigen Vectors and Eigen Values for Each Principal Component

		Eigen Vectors		
		1.	2.	3.
Principal	1.	-0.21561	0.78806	0.57661
Components	2.	0.79201	-0.20426	0.57533
	3.	-0.57117	-0.58072	0.58011

transformed scores explained over 99 percent of the variance, and the last transformed score had almost no variance within the fifty subjects, the first two transformed scores (termed EIG 1 and EIG 2) which were orthogonal were used in the clustering program as measures of the composition of the extended network.

Tables 7 and 8 present the data of the principal components analysis for the composition variables of the intimate network (%RELATIVES (2), %FRIENDS (2), and %OTHERS (2)).

Again the matrix (3x3) of eigen values was multiplied with the matrix of the original data (50x3) resulting in three transformed scores for the composition of the SIZE 2 network for each subject. Since the first two transformed scores explained over 99 percent of the variance, and the last transformed score had little variance within the fifty subject, the first two transformed scores (termed EIG 4 and EIG 5) were used in the clustering program as measures of the composition of the intimate network.

The transformed composition measures (extended network - - EIG 1 and EIG 2; intimate network - - EIG 4 and EIG 5) were used in the cluster analysis instead of the original six measures. Thus, the total number of network characteristics used in the clustering analysis was eight: SIZE 1, DENSITY 1, EIG 1, EIG 2, SIZE 2, DENSITY 2, EIG 4, and EIG 5.

Scores on each of these eight variables, comprising

TABLE 7

Principal Components of Composition Variables in the Intimate Social Network

Principal Component	Eigenvalues	Percent Variance Explained by the P.C.	Cumulative Variance Explained
1.	1495.5176	70.88	70.88
2.	614.3317	29.12	99.99
3.	0.0920	0.01	100.00

TABLE 8

Columns of Eigen Vectors and Eigen Values for Each Principal Component

		Eigen Vectors		
		1.	2.	3.
Principal	1.	0.63359	-0.51475	-0.57758
Components	2.	-0.76279	-0.29085	-0.57755
	3.	0.12930	0.80650	-0.57693

network profile for each subject, were first entered in the NORMIX clustering program, which uses a method of maximum likelihood estimation. The result of this initial cluster analysis (which are included in Appendix III) was the identification of five clusters. However, since the NORMIX program is most effective when the initial estimates (of the means and standard deviations) for the variables used in forming the clusters are specified by the user, it was decided that further refinement was possible through the use of an additional clustering procedure, MIKCA.

The eight network variables were entered into the MIKCA program. A cluster solution for from 1 to 6 clusters, using two criterion measures (the determinant W (/W/) and Bayes modification of determinant W) was analyzed. Table 9 summarizes the results of the MIKCA clustering procedure. The point at which the criterion measure /W/ appeared to level off, indicating little increment in the criterion with the inclusion of more clusters, was between three and four clusters (see Figure 3). The log of the Bayes Factor 1 of /W/, though less conclusive, showed the largest drop between the four and five cluster solution.

As noted in Chapter III, inherent in many clustering criteria like the determinant W is the tendency to split the data set into approximately equal sized groups, unless the groups are widely separate. The Bayes criterion was employed as a check on this tendency. The fact that both the /W/ and Bayes criterion provided nearly identical

TABLE 9

Results of the MIKCA Clustering Procedure

# of Clusters	Criterion Optimized	
	Determinant of the Within Clusters Matrix (/W/)	Log of Bayes Factor 9 of /W/
1	.4683 E 16	1639.14
	(.2644)*	(46.37)*
2	.2039 E 16	1592.77
	(.1147)	(49.49)
3	.8923 E 15	1543.28
	(.0418)	(35.21)
4	.4740 E 15	1508.07
	(.0117)	(54.29)
5	.3575 E 15	1453.78
	(.0253)	(35.36)
6	.1222 E 15	1418.42

*Numbers within parentheses refer to differences between criterion scores for 2 clusters.

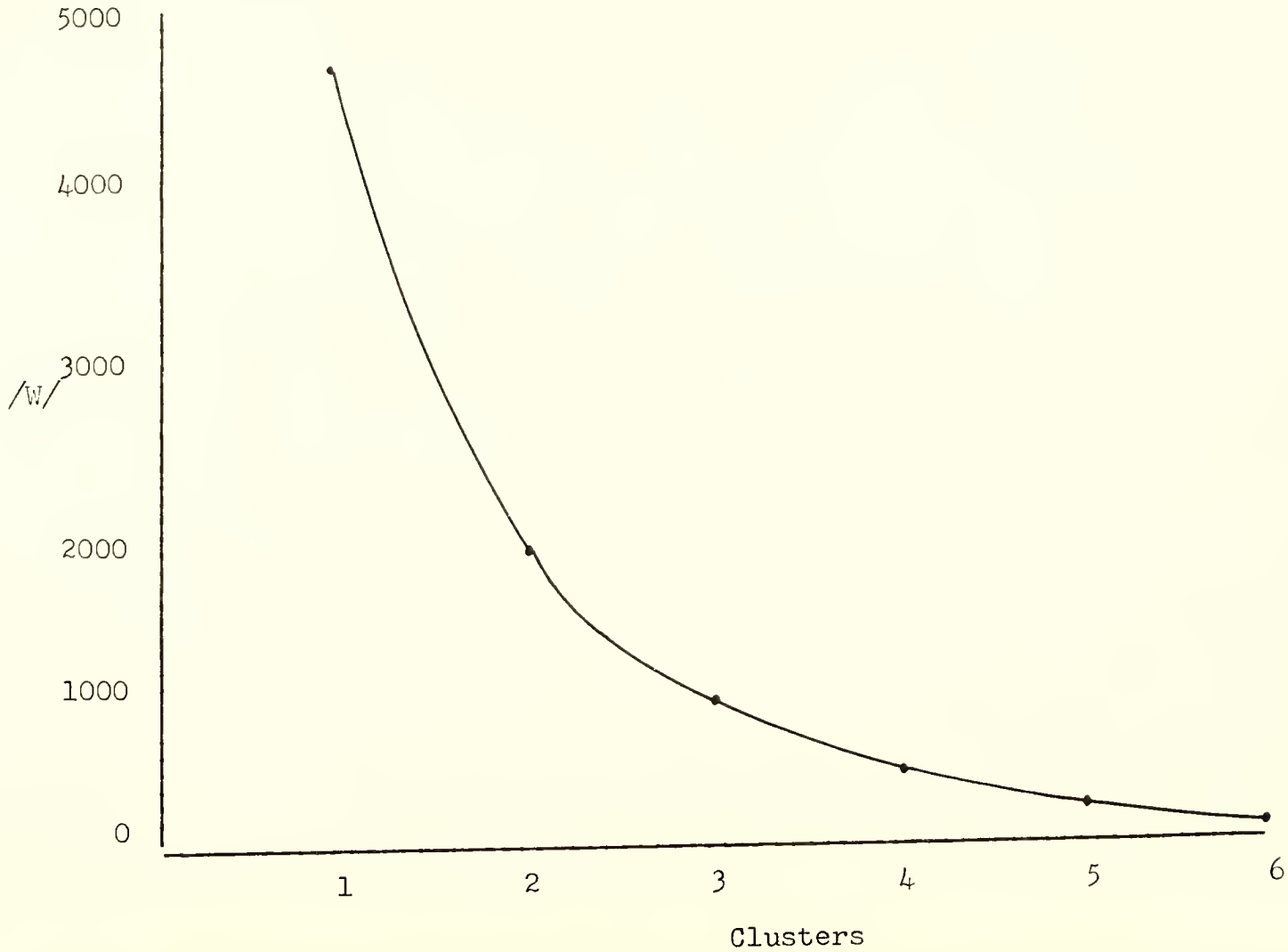


Figure 3: Plot of the Criterion ?W? for the MIKCA Clustering Procedure

solutions, and the data set was not divided into equal sized groups (clusters) indicated that for this sample, the networks (as described by the eight network properties) are very distinct. Be this as it may, a more difficult problem was selecting the best cluster solution. Significance tests for determining the optimum cluster solution are not perfected. Consequently, the selection of a final cluster solution is a mixture of subjective assessment based upon interpretation within limits established by certain indicators (the point at which the criterion value appears to level off).

Judging the mean scores (and number of subjects in each cluster) from a qualitative point of view, all solutions appeared to fall within the bounds of reason. The six cluster solution resulted in one cluster with only three people and this was deemed too small for later analysis. Looking at the solutions using the criterion measure /W/, the iterations were not converging in a normal fashion following the four cluster solution. Thus, four clusters were identified as an outer limit of valid clusters for the data. Similarly using the criterion Bayes Factor 1 of /W/, after the four cluster solution, clusters were forced by making a fifth cluster with only one person (hence the drop in the criterion value between the fourth and fifth cluster solution). This too was unacceptable. The three cluster solution using both criterion were also virtually identical, with only three individuals classified differ-

ently.

The initial estimates (means and standard deviations) on the eight network properties for the three and four cluster solutions were entered in the NORMIX program, since it appeared that the optimum cluster solution for the data lay in one of these two solutions. The NORMIX program was in assessing which solution, the three cluster or four cluster, maximized the log likelihood for the data.

Table 10 shows the results of the NORMIX clustering procedure using the initial estimates for three and four clusters taken from the MIKCA program. A comparison between the initial NORMIX run without initial estimates (presented in Appendix III, Table III.1) and the NORMIX run with initial estimates taken from the MIKCA program revealed that the log likelihood for three clusters, log of the likelihood ratio chi square, and probability level between two and three groups was increased. The NORMIX procedure completely rejected the four cluster initial estimates. Following the iterative procedures, the program recombined the subjects into the three groups which were identical to the three cluster solution. Consequently, the three cluster solution was accepted as the best clustering solution for the sample based on the eight network variables.

Table 11 shows the weights applied to each of the eight variables, for the two best discriminant functions, which resulted in maximum discrimination between the three

TABLE 10

Results of NORMIX Clustering Procedure with Initial Estimates for 3 and 4 Clusters Derived From MIKCA

# Clusters	Log Likelihood	Log of Likelihood Ratio Between Types	Chi Square	df	p
1	-1221.74	———	—	—	—
2	-1206.43	1/2 (15.310)	24.80	16	.07
3	-1178.89	2/3 (27.53)	44.05	16	.0002
4	-1178.89	3/4 (-14217.32)	-0.00	16	1.0

TABLE 11

Standardized Weights for Eight Variables
in the Three Cluster Solution

Variable	Standardized Weights	
	Discriminant Function 1	Discriminant Function 2
SIZE 1	.4748	-1.2513
DENSITY 1	.1090	- .3136
EIG 1	-.2447	- .6690
EIG 2	.5691	- .3167
SIZE 2	-.0985	3.3387
DENSITY 2	-.4856	.3440
EIG 4	-.3407	- .8843
EIG 5	2.7211	- .6870

clusters.

Discriminant function 1 was dominated by one of the composition variables in the intimate network (EIG 5) which was given five times the weight of the next most important variables (EIG 2, DENSITY 2, SIZE 1). Discriminant function 2 was dominated by SIZE 2 and SIZE 1, with EIG 4, EIG 5, and EIG 1 the next most heavily weighted variables. A plot of the discriminant scores for each subject, based on the weights for these two discriminant functions may be seen in Figure 4.

As result of the clustering procedures, three clusters were identified for the sample; each cluster characterized by scores on ten structural properties of the social network. Scores on the ten properties were standardized (Mean = 50, SD = 10) in order to facilitate comparison. Table 12 presents the Means, SD, and standard scores on each of the ten network properties that define the three clusters. These ten scores form a profile for each cluster. Differences between the clusters' profiles are charted in Figure 5 using standardized scores.

Since the purpose of clustering criterion and algorithm is to give a set of clusters that are well differentiated from each other, it comes as no surprise to find that differences between group mean scores on the ten network properties are highly significant (Multivariate F = 18.078, $p < .001$; univariate F-tests revealed significant ($p < .05$ or $< .01$) differences on all variables except %FRIENDS (2) ($p < .65$)). Anderberg (1971) suggested that such multivariate

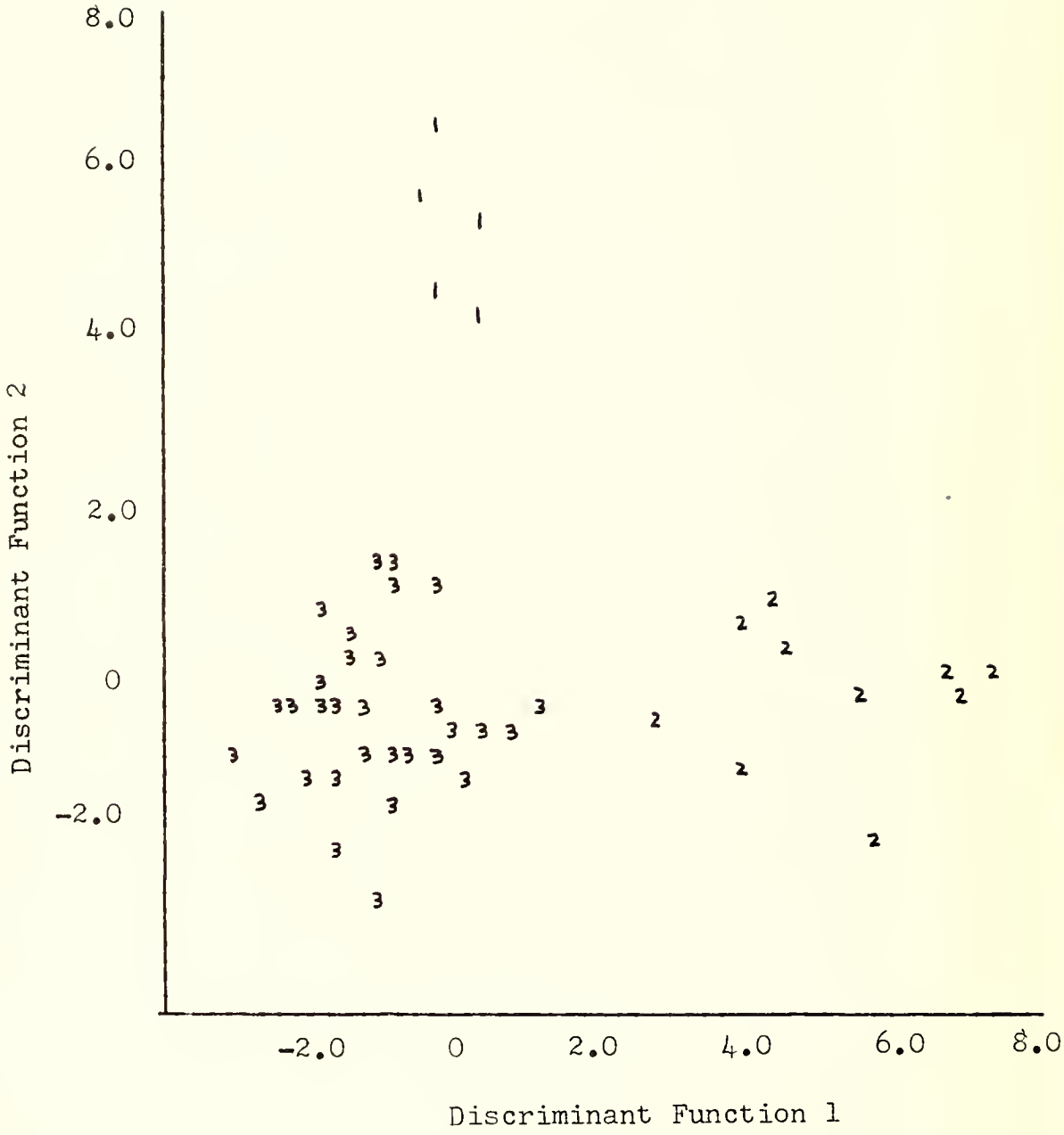


Figure 4: Plot of Discriminant Functions 1 and 2 for the NORMIX 3 Cluster Solution

TABLE 12

Mean, SD, and Standard Scores (Z) on the 10 Network Variables for the Three Cluster Solution

		Clusters		Total Sample
	1 (N=5)	2 (N=10)	3 (N=35)	(N=50)
SIZE 1	M= 51.60	32.10	23.71	28.18
	SD= 3.78	5.63	8.23	11.31
	Z= 70.71	53.47	46.05	
DENSITY 1	M= 41.11	33.05	49.97	46.03
	SD= 11.44	5.05	15.98	15.63
	Z= 46.86	41.70	52.52	
%RELATIVES (1)	M= 22.74	14.44	34.12	29.04
	SD= 23.39	8.43	19.98	20.01
	Z= 46.85	42.70	52.52	
%FRIENDS (1)	M= 71.14	28.71	42.96	42.92
	SD= 23.60	11.13	23.70	24.09
	Z= 61.71	44.10	50.02	
%OTHERS (1)	M= 6.12	56.15	22.93	27.89
	SD= 6.13	11.91	18.07	22.02
	Z= 40.11	62.83	47.75	
SIZE 2	M= 48.40	22.70	16.51	20.94
	SD= 5.60	5.62	7.31	11.72
	Z= 73.43	51.50	46.22	
DENSITY 2	M= 40.44	36.83	58.56	52.70
	SD= 12.70	13.53	20.08	20.42
	Z= 44.00	42.23	52.87	
%RELATIVES (2)	M= 20.28	6.72	30.85	24.96
	SD= 24.99	11.38	29.25	27.63
	Z= 48.31	43.40	52.13	
%FRIENDS (2)	M= 76.24	42.27	63.85	60.77
	SD= 25.58	14.38	32.43	30.37
	Z= 55.09	43.91	51.01	
%OTHERS (2)	M= 3.48	51.02	5.21	14.20
	SD= 4.77	14.08	7.61	20.61
	Z= 44.80	67.87	45.64	

analysis of variance probably does not say too much since "highly significant results should occur with monotonous regularity" (p. 177). Nevertheless, such tests do demonstrate the feasibility of grouping the subjects in this study according to network characteristics.

In describing the characteristics of the ten network properties for the entire sample or the individual clusters some mention should be made of what the terms "large" and "small" mean. Like the "close-knit" and "loose-knit" these words are relative to the sample under investigation. Mitchell in discussing the size of the network stated that although there is not enough empirical evidence to provide estimates, "a general impression is that the limit of the number of people with whom an individual might be in direct and regular contact in an urban environment may be about 30 persons" (Mitchell, 1969, p. 20).

In the present analysis "large" and "small" refer to the relationship between a particular cluster and the entire sample, or the relationship between two clusters. Hopefully, by providing baseline data on this sample, further research may be made which can establish norms for these measures.

Overall, as Figure 5 shows, Cluster 1 and 2 exhibited quite parallel characteristics except for the %OTHERS in their networks where they diverge markedly. To summarize the data on the profile mean scores, as presented in Table 12 and Figure 5, compared to the entire sample:

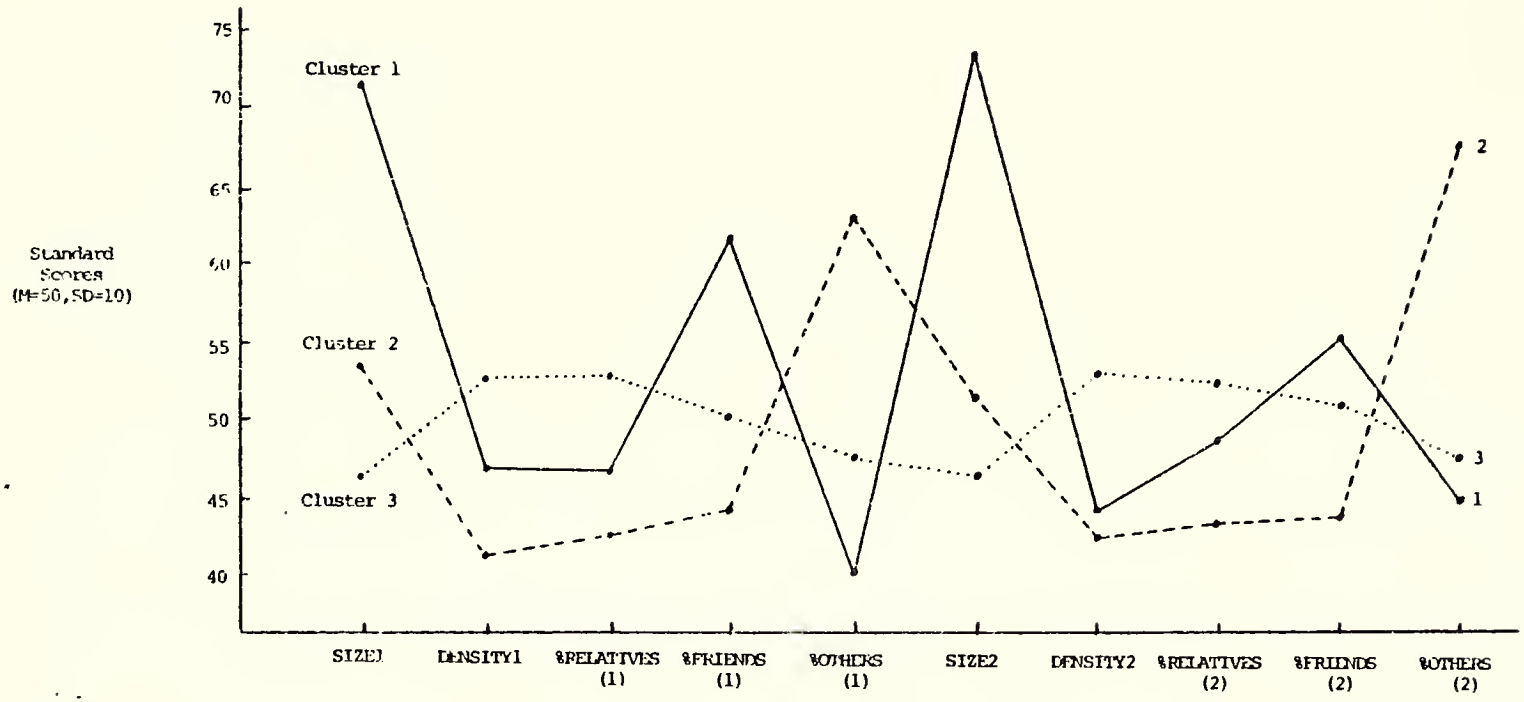


Figure 5: Profile of 10 Network Characteristics for Three Clusters.

Cluster 1 had larger size (more people) and a greater proportion of the network as friends; smaller density, percent relatives and percent others.

Cluster 2 had larger size and greater proportion of the network as others; smaller density, percent relatives and percent friends.

Cluster 3 had smaller size and proportion of the network as others, larger density and percent friends, percent relatives.

One final observation comparing the three clusters is suggested by Table 13. We would expect the clusters to be relatively homogeneous since that is the purpose of clustering. However, some clusters are more homogeneous than others. When homogeneity (variance within the cluster) is combined with the rank of the cluster on the ten network variables, some of the distinguishing features of each cluster are identified.

In every case but one (DENSITY 2), the cluster having the lowest within-cluster variance was also at one extreme (either largest or smallest) on the network properties. A summary then of the distinguishing characteristics of these three clusters would include:

Cluster 1: largest size and smallest proportion of network who are categorized "others" (highest %FRIENDS);

Cluster 2: smallest density, %RELATIVES, %FRIENDS (highest proportion of the net is others);

Cluster 3: lack of homogeneity (amorphousness);

TABLE 13

Clusters with Lowest Within-cluster Variance on 10 Network Variables

Network Property	Cluster	Rank on Property
SIZE 1	1	largest
DENSITY 1	2	smallest
%RELATIVE (1)	2	smallest
%FRIENDS (1)	2	smallest
%OTHERS (1)	1	smallest
SIZE 2	1	largest
DENSITY 2	1	middle
% RELATIVE (2)	2	smallest
%FRIENDS (2)	2	smallest
%OTHERS (2)	1	smallest

and smallest size (1 and 2), highest density (1 and 2) and greatest %RELATIVES.

Discussion

Correlation analysis indicated that size was significantly related to density for both the extended (-.30, $p < .05$) and intimate (-.32, $p < .05$) networks. The negative correlation confirmed a relationship between the two variables previously reported in the literature on social networks: the larger the network and the lower the density.

One feature of the networks of this sample of young adults, however, did vary considerably from the findings reported on the social networks of other samples. Bott (1971) in her review of network studies since 1957, noted that kin are of special importance in any type of network. Further, in his introduction to Bott's reissued book, Gluckman maintained that where there are close knit networks, kin are at their core. The findings reported in Table 12 do not entirely support this observations for this sample of young adults. Kin did not seem to be particularly important to the subjects, nor was high density associated with the existance of a high proportion of relatives in the network.

As suggested in the first section on self-planned learning, part of the reason for the divergence between the findings of this study, and those using other samples of individuals, may be because the importance of kinship

is relative to the age of the individual and his movement through the life cycle. At this point in their life, the young men who form my sample, are more vitally concerned with social activities (dating, parties, friendship, etc.) which often appeared to exclude kin. They are in a transitional stage of life: moving from a highly structured existance (centered around the home and school) to a more loosely defined existance, faced with major decisions concerning marriage and occupation (career). This suggests that an evolutionary view of social networks may be important when one attempts to generalize from the findings of any one particular sample. One may have to take into account the stage in the life cycle for the subject interviewed. This idea is certainly not new, and in fact is considered of major importance in gerontology (disengagement theory), psychoanalysis (Erickson's seven life stages) and adult education (Havighurst's developmental stages). The effect of life cycle on social networks has not been studied explicitly. Some of the subjects indicatedthat they did have large numbers of relatives in the area, but they were not important to them, not seen regularly, and never seen voluntarily. This explains, in part, why relatives were the least likely to be called upon for assistance in the learning projects.

Turning to the clusters, the following vignettes of the three network profiles are presented in order to focus the reader's attention upon the salient characteristics

of each cluster. Examples are included to temper the idealized cluster descriptions, and to some extent demonstrate the wide variation which existed within one cluster type.

Cluster 1. It should be noted that in all the clustering procedures used, when two clusters were specified, Cluster 1 was the first partition of the total sample in every case. In some sense then, it is the most distinguishable group of network characteristics for this sample. Its most distinctive features are its large size (both extended and intimate networks) and small %OTHERS (in both extended and intimate networks). Further, the within cluster variance in both of these categories was the lowest of all the clusters.

SIZE 1 and SIZE 2 of cluster 1 were both above the mean for the entire sample, and in fact, all subjects reported networks which had a size greater than two standard deviations above the mean for the entire sample. These very large networks were usually composed of several large cliques of individuals. Here and elsewhere, "clique" refers to any group of people within the subject's personal social network with a density score of over 80 percent and frequently 100 percent.

These large cliques were frequently, friends, but occasionally relatives. In addition to these large cliques, there were often a number of separate and isolated individuals. These individuals are in most cases "close"

to the subject. In these networks the proportion of people considered "others" (or distant) in the networks is very low. The cliques within the networks were usually self-contained, although one or two individuals in each clique might see and know people in the other cliques. These characteristics explain why it is possible for the networks to have pockets of individuals with 100 percent density, and yet the density scores for the entire network are below the mean for the entire sample. Variance for DENSITY 1 was quite great, however, DENSITY 2 scores showed the lowest within cluster variance for the sample - - 80 percent of the networks were below the sample mean on DENSITY 2.

The composition of the cluster 1 networks was not a very distinctive feature. The proportion of relatives in the extended and intimate networks showed greater within cluster variance than any other cluster. These proportions, however, were below the average for the entire sample. The %FRIENDS in both the extended and intimate network were highest of the three clusters. Eighty percent of the networks had a proportion of the network as friends greater than the mean for the entire sample. The increase in the proportion of friends between the extended and intimate networks, however, was less than the increase for the total sample. There was a greater proportion of friends in the intimate network than the extended but not as great a difference between the two

as for the sample of the other clusters. This is apparently because the %REALTIVE remained constant and some friends out of the large pool, who were not considered "close" were excluded. The cluster 1 networks were marked by a very low percentage of others in both the extended and intimate networks. In general, the composition of the cluster 1 networks consisted mainly of friends, some relatives, and few individuals who were not realtives or friends.

One explanation for both the large size and composition of the cluster 1 networks may lie in some of the other information supplied by the subjects. All the subjects in cluster 1 were born in the area, and indicated that they had moved less than once in the last 10 years. Further, all had lived in their neighborhood for more than 15 years. Those that had moved, usually retained their friends from their old neighborhood and high school.

As a consequence of these life-history features of the individuals, it is safe to say that the networks were marked by long term friendships. Further, friends were seen often by the subject. In fact, maintaining the large number of relationships (indicated by the large size of the network) took a tremendous amount of activity (frequency of contact). In part the high frequency of contact between the subjects and the individuals in the networks was possible because the subjects saw many friends together at one time (thus, the clique structure indicated above).

One example of the large size, cliques, plus a few isolated friends may be seen the map of subject #13's network (Figure 6). Maps contain genealogical links between ego and kin; social links between the subject (ego) and members of his network are not included on the map because everyone is known and seen by him. Individuals were identified by initials or first names (later used in discussing the helpers for the learning projects). Links between members of the network are noted and the frequency of contact between ego and other network members is given. Individuals in the intimate network are denoted by filled in circles (males) or triangles (females).

Subject #13 indicated that he had over 10 relatives in the area, but that they were never seen, and not very important to him. Of greater importance were the groups of friends that he maintained frequent contact with in scouts, band, church, and work. In addition to these cliques there were approximately 8 individuals who he saw regularly who were not considered members of the cliques. The cliques were relatively self-contained, although one or two individuals from each clique maintained contact of some sort with individuals in other cliques.

Subject #13's network points out one difficiency in the measure of density. It is possible to have a network composed entirely of cliques of individuals (each with 100 percent density) and have a density score for the entire network which is exactly the same as a network with no

SIZE 1 =48
DENSITY 1 = 28.5
SIZE 2 = 42
DENSITY 2 = 27.4

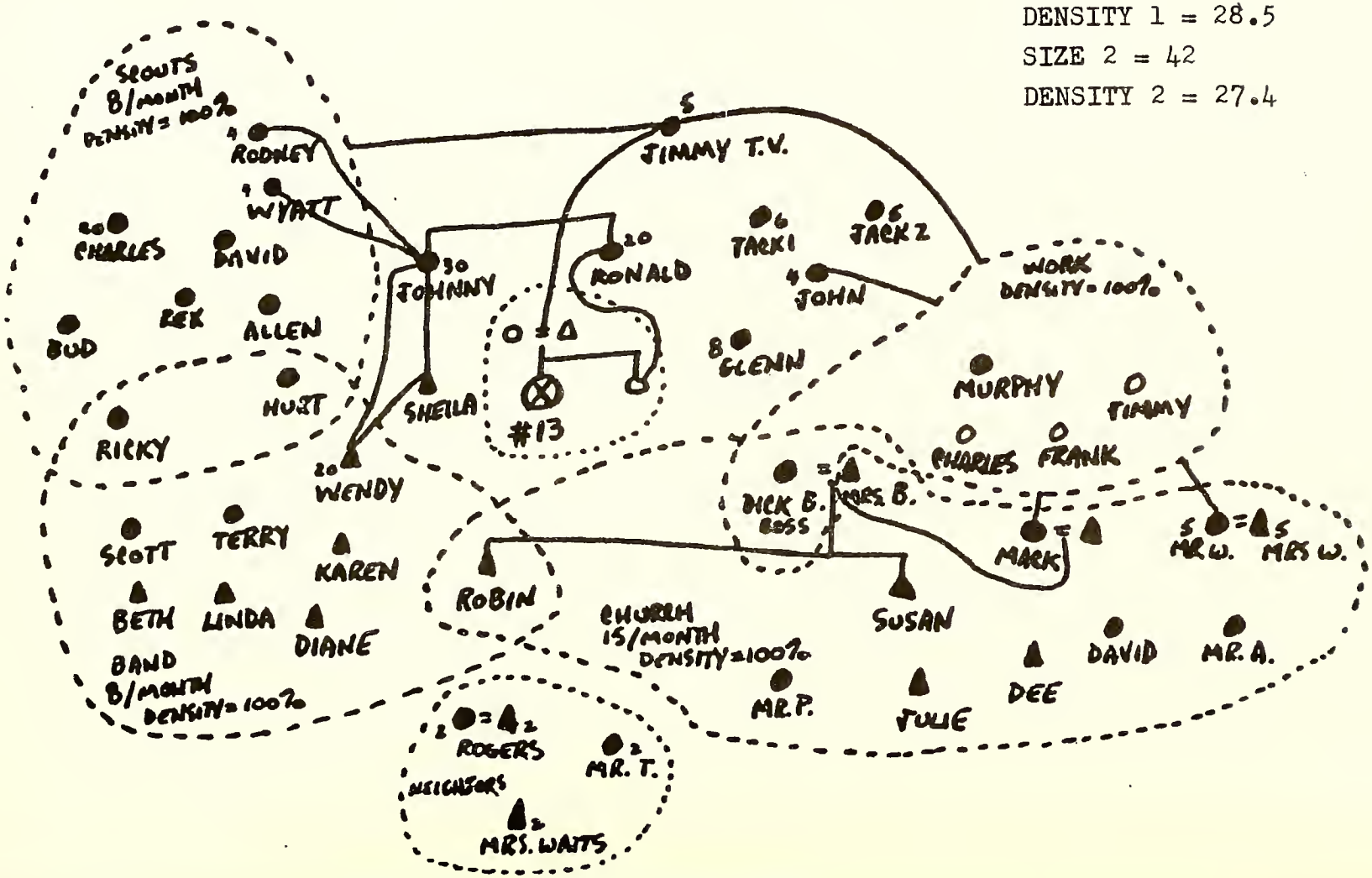


Figure 6: Social Network for Subject #13.

cliques at all. The character of the two networks is different, as is the nature of the interaction, yet the differences are not reflected in the measure of density as it is computed in this study.

In a limited sense, this problem may be demonstrated by the network (Figure 7) of the only individual in the cluster 1 who was married. It shows the distinguishing characteristics of the cluster 1 networks (large size, low density, few others) but it also has a greater proportion of relatives than the other networks in this cluster.

Marriage tends to increase the number and proportion of relatives in the network as well as the density of the network. However, in subject #42's network, the two sets of relatives act as separate cliques. Each set of relatives knew each other, but the two sets did not interact. This behavior was quite different from the married individuals in the cluster 3 networks where the two sets of relatives frequently interacted both with each other and the subject's friends. In subject #42's network some of the relatives interacted with some of the friends, but not very many of them. This, in combination with the fact that the subject's friends were largely married couples who clustered together in small isolated social cliques, resulted in a low density for the entire network.

Since the cluster 1 networks contained very few "others" (most individuals were either relatives or were considered friends), it might be well to clarify what this category

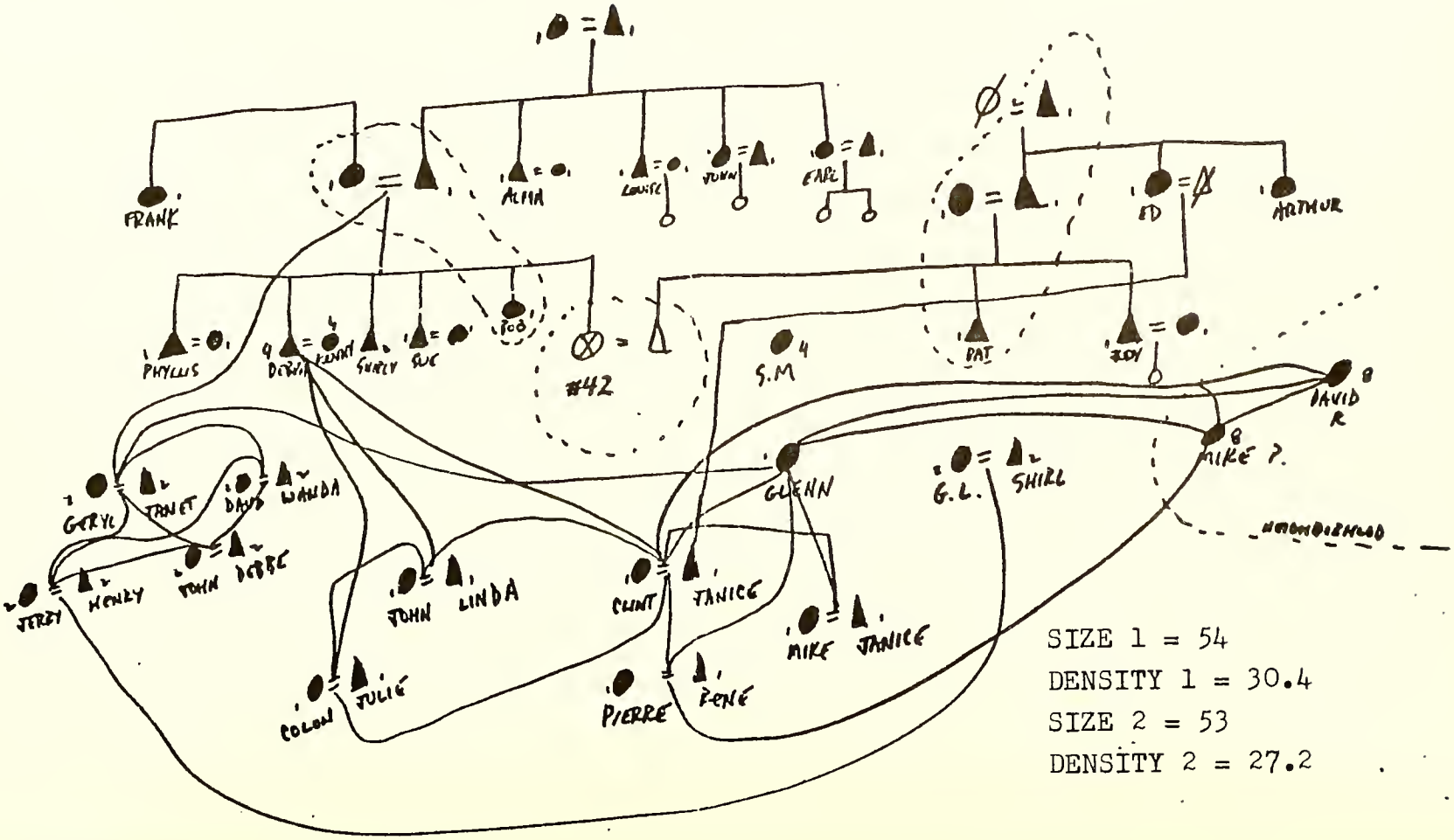


Figure 7: Social Network for Subject #42.

means. First, "others" were not kin, and they were not "close friends" as defined by the subject. Some of the "others" were acquaintances, seen every so often, on friendly terms, usually for some specific purpose (like a barber, salesman, doctor, or auto mechanic). Some were a variety of people not even considered "sort of friends", but seen regularly (like people at church, work, and other regular social gatherings). Even the intimate network of people seen voluntarily was often composed of people not considered "close friends". Ties in this case were on the basis of mutual interests, not social interaction. For cluster 1, however, there were few people in this category: nearly everyone was either a relative, or a friend.

Cluster 2. Cluster 2 networks were of moderate size, compared to cluster 1. Nevertheless, they were larger than the average for the entire sample, and 70 percent of both the intimate and extended networks in this cluster were larger than the average for the sample. One of the major differences between the cluster 1 and the cluster 2 networks was the density of the extended network. Every extended network in this cluster had DENSITY 1 scores below the mean for the sample; 70 percent of those networks lay in the bottom quartile for the sample with densities below 35.1 percent. DENSITY 2 displayed greater range and variance than DENSITY 1. However, 70 percent of the networks in the cluster still fell in the lowest quartile of all the networks in the sample, with density scores

below 37.8 percent. Like cluster 1, 80 percent of the networks had DENSITY 2 scores below the mean for the sample.

One of the distinguishing features of cluster 2, with regard to SIZE and DENSITY, is the existance of small cliques of individuals considered "friends" and "others" usually with a density of 100 percent. The cliques were much smaller than the cluster 1 cliques, and usually not related to other cliques which may exist in the network. Further, in addition to the cliques, these networks have other acquaintances, often isolated from the cliques of social friends. All of these features lead to the low DENSITY scores for both the intimate and extended networks.

Insofar as composition, cluster 2 had the lowest within-cluster variance for the proportion of friends and relatives in both the extended and intimate regions of the network. Cluster 2 was characterized by the lowest proportion of friends and relatives and highest proportion of others. In both the extended and intimate regions, 90 percent of the cluster 2 networks had a proportion of the relatives below the mean for the entire sample. Relatives, then, were not an important feature of these networks and the moderately large size of the cluster 2 networks was not due to the existance of relatives. Further, the proportion of the network composed of friends was low: 80 percent of the cluster 2 networks fell below the mean for the sample; 40 percent in the lowest quartile.

Apparently, the moderately large size of the cluster 2 networks was also not due to the existance of friends.

The low %RELATIVES and %FRIENDS coupled with high %OTHERS probably explains the lower density exhibited by these networks. All the cluster 2 networks were above the mean for the sample on the proportion of others: 70 percent of the extended networks were above the mean and even 60 percent of the intimate networks were greater than one standard deviation above the mean. The subjects in the cluster 2 networks saw a number of people on the basis of shared interests - - interaction which is voluntary, and quite frequent, but not necessarily socially motivated.

Quite often, subjects in the cluster 2 networks indicated that there were no relatives beyong their immediate family. Unlike the cluster 1 subjects, half of the subjects in cluster 2 were born outside of the State. Although half of the cluster 2 subjects indicated that they had lived in the area for over 10 years, they had moved more frequently than the cluster 1 subjects. Taken together, being born outside of the State, and moving frequently explains why there were not the large cliques of neighborhood friends which were noted in cluster 1. The low proportion of relatives in the networks is partially explained by the fact that a half of the subjects in cluster 2 had moved into the area - - leaving most of their kin in other states. Further, no one in the cluster 2 networks was married. As noted, marriage tends to increase

the proportion of relatives since one adds another set of relatives to his own, increasing the proportion of the network which is relatives, and usually increasing the size of the extended network.

Moderate size, low density, small cliques of unrelated individuals, few relatives, and a large proportion of others were all exemplified by the network of subject #17, shown in Figure 8. Note that in comparison to the cluster 1 examples, the cliques were smaller and in only two cases do individuals in one clique even know individuals in the other cliques, let alone see them socially. Further, in subject #17's network, approximately one half of the individuals were not considered close friends.

The network of subject #25, shown in Figure 9, illustrates another cluster 2 pattern: moderate to large size, low density, few relatives, many others. In addition this network is characterized by the existance of friends who individually saw each other socially, but who did not get together as a group very often. Hence the network was not composed of cliques as defined. This network points out one of the deficiences of the measure of DENSITY. The DENSITY 1 and DENSITY 2 scores for the networks of subject #25 were equal to the density scores for subject's #13 and #17 - - yet the character of the interaction without cliques is somewhat different. Low density may mean a number of relatively isolated individuals, or it may mean a number of cliques with 100 percent density, each of which

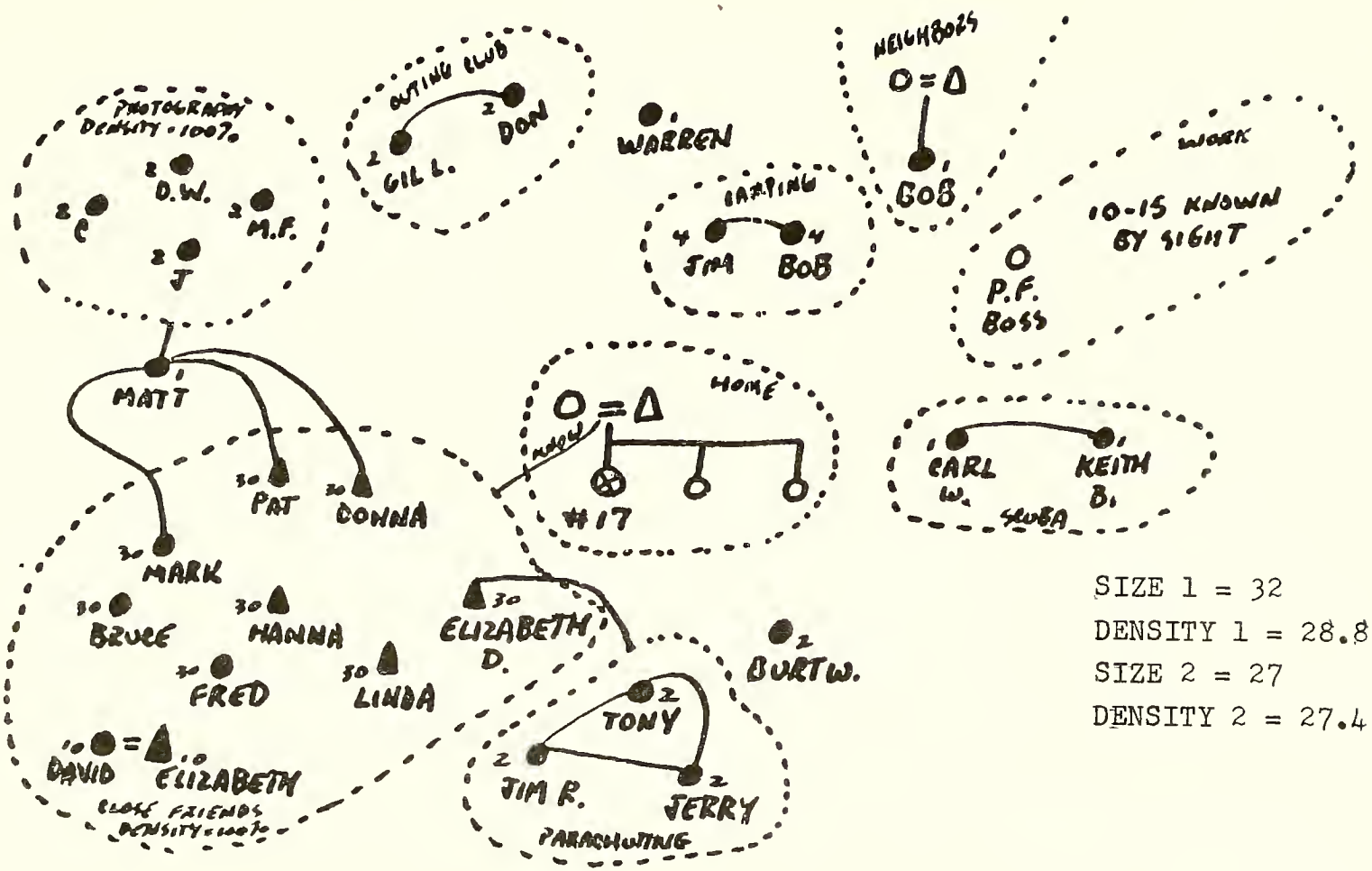


Figure 8: Social Network for Subject #17.

SIZE 1 = 35
DENSITY 1 = 31.5
SIZE 2 = 24
DENSITY 2 = 37.8

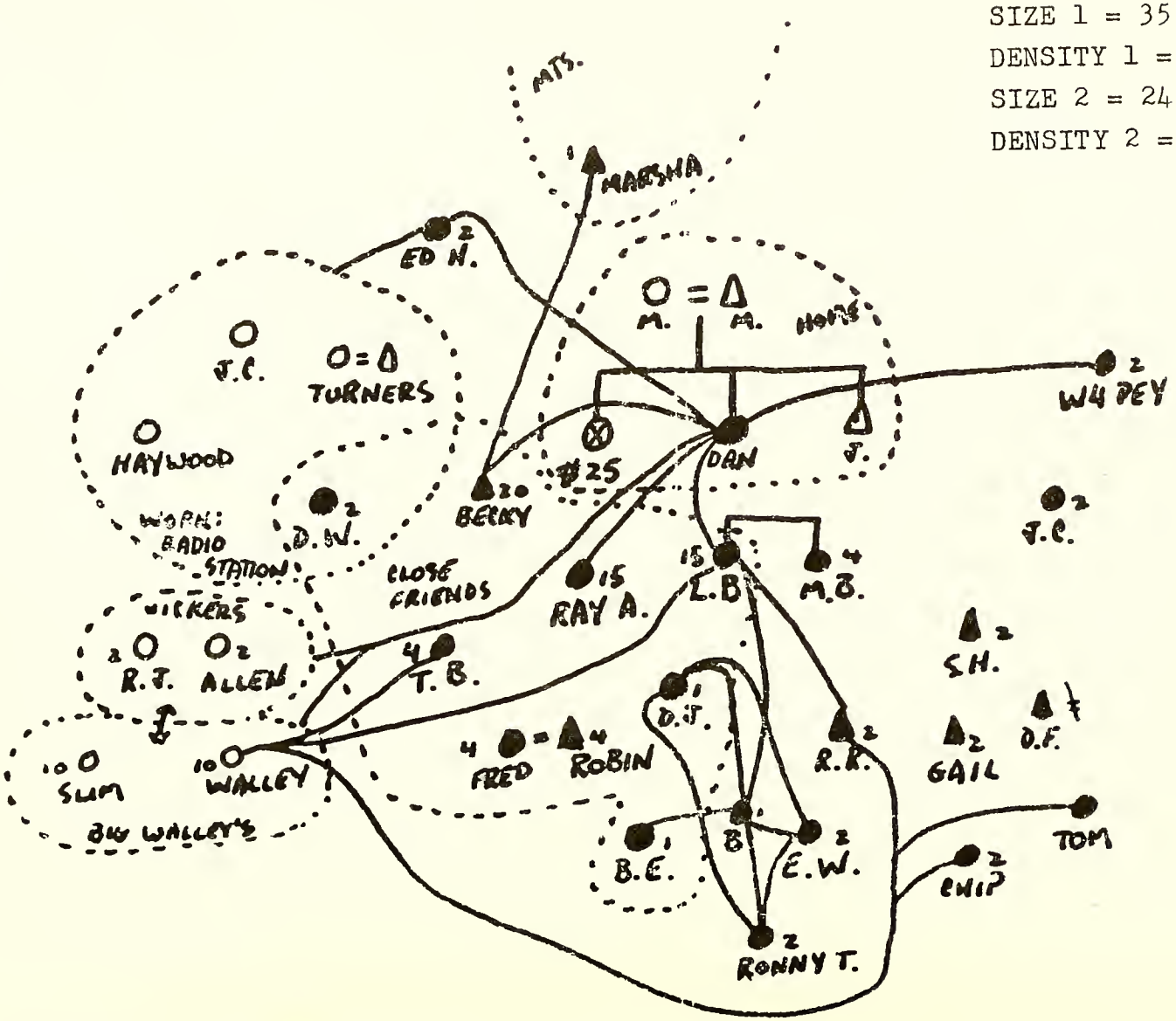


Figure 9: Social Network for Subject #25.

is not linked with the others.

Cluster 3. Cluster 3 was the least homogeneous (exhibiting the highest variance on all the network property scores) of the three clusters identified in the clustering procedures. Taken together, however, a general pattern emerged: smallest size, highest density, smaller proportion of the network composed of others, higher proportion of friends and relatives.

SIZE 1 and SIZE 2 exhibited the same pattern: 78 percent of the networks in cluster 3 were below the mean for the entire sample; 23 percent of the networks were greater than one standard deviation below the mean. DENSITY 1 and DENSITY 2 showed great variance and did not seem to be a very distinguishing characteristic. Density scores, however, over the entire cluster were higher than the mean for the sample. Further, in cluster 3 low size was associated with high density - clusters 1 and 2 were the reverse. Insofar as composition the cluster had wide within cluster variance. While 42 percent of the networks were in the lowest quartile of the entire sample on the proportion of relatives, 31 percent of the networks were in the highest. Similarly, for proportion of the friends, 23 percent were in the lowest quartile while approximately 28 percent were in the highest. The composition findings suggest that the networks were either composed of a high proportion of friends and a low proportion of relatives, or a high proportion of relatives and a low proportion of friends.

A check of the findings related to the %OTHERS in the cluster 3 networks bears this out: although there was wide variance in the %OTHERS in the extended network, 60 percent of the networks were below the proportion of others for the entire sample, 25 percent in the lowest quartile. The intimate network was even more explicit: 89 percent of the networks were below the average proportion of others - - 57 percent of the networks had no individuals in the "other" category at all. In the intimate network then, for cluster 3, it appeared the people are either relatives or close friends; there are not as many isolated acquaintances as there are in the cluster 2 networks.

One explanation for the wide variance in this cluster comes from the additional information supplied in the social history questions. While two thirds of the cluster 3 subjects were born in the area, had lived there for more than 15 years, and had moved less than four times in the last 10 years; eight subjects were born outside of North Carolina, lived in the area less than 10 years, and had moved from 6 to 11 times in the last 10 years. Further, unlike clusters 1 and 2, cluster 3 contained most of the married subjects in the sample (one third of the cluster 3 members).

Taking marriage into account with the network properties examplified by this cluster, three sub-groups emerged in cluster 3. These sub-groups were not identified by the clustering procedures and they are described here only to

illustrate one plausible grouping which explains the variation within the cluster. All of the examples considered below are characterized by the basic properties of cluster 3 networks. The three sub-groups in cluster three all conformed to the basic pattern outlined above: compared to clusters 1 and 2 they all have smaller sized networks, higher density, higher %RELATIVES and %FRIENDS, and lower %OTHERS. Note also, that in cluster 3 networks if relatives existed they were more likely to be included in the intimate network of the subjects, resulting in higher density scores.

Sub-group 1: married subjects with two sets of relatives who interacted with each other and with the subject's friends.

Figure 10 shows a highly inter-related network of relatives and friends. Not only did the parents of subject #32 and the parents of his wife see each other socially, and frequently, but the brother of the subject and both the brother and sister of the wife saw and interacted with the friends of the subject and his wife. People at work were considered "others" for the extended network - - there were no "others" in the intimate network. It was composed entirely of relatives and close friends.

Subject #47 reported a network (Figure 11) which had a slightly differend configuration: small size, high density, and few others. In this example, relatives of both the subject and his wife were very friendly (in fact, living

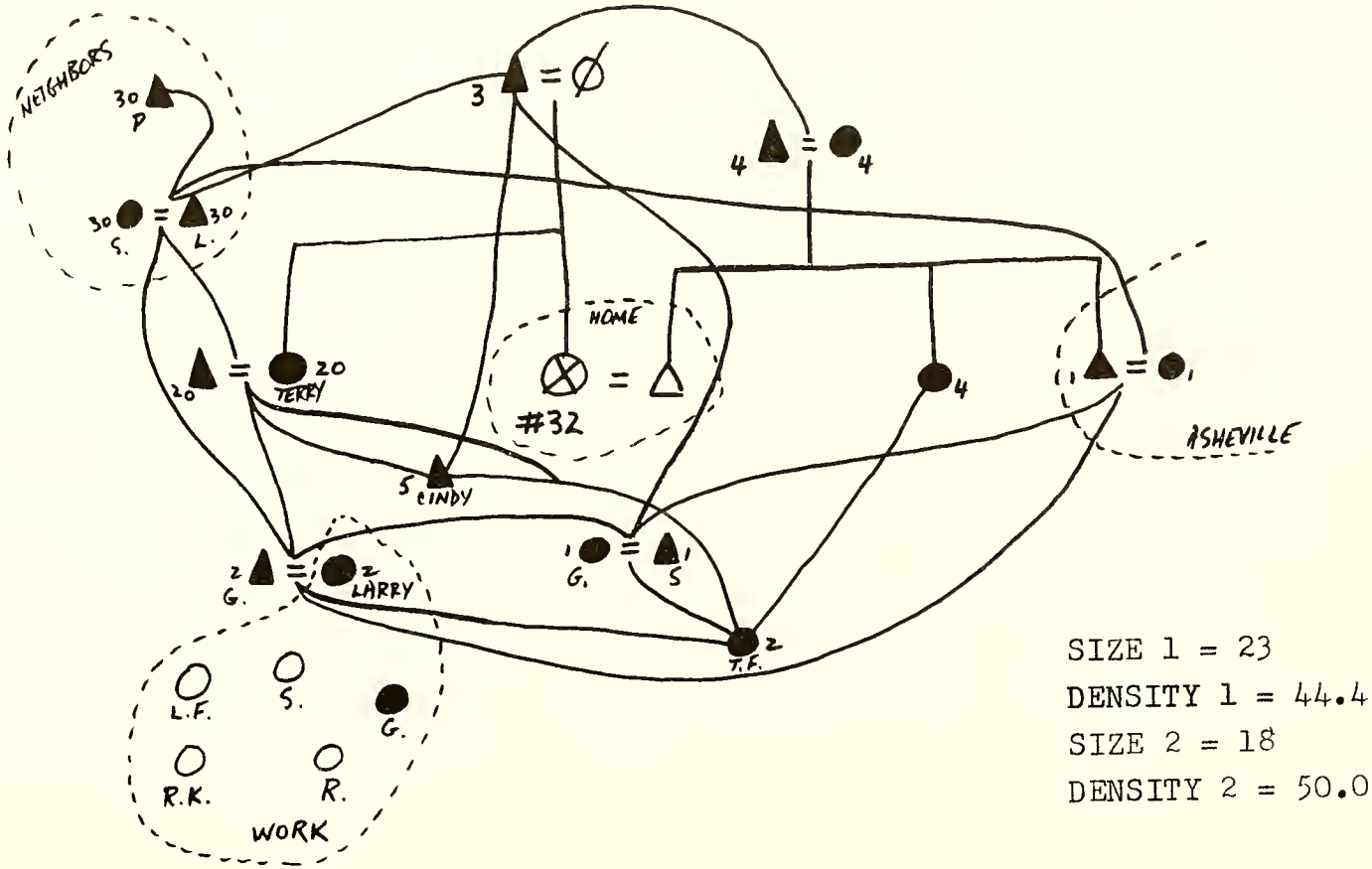


Figure 10: Social Network for Subject #32.

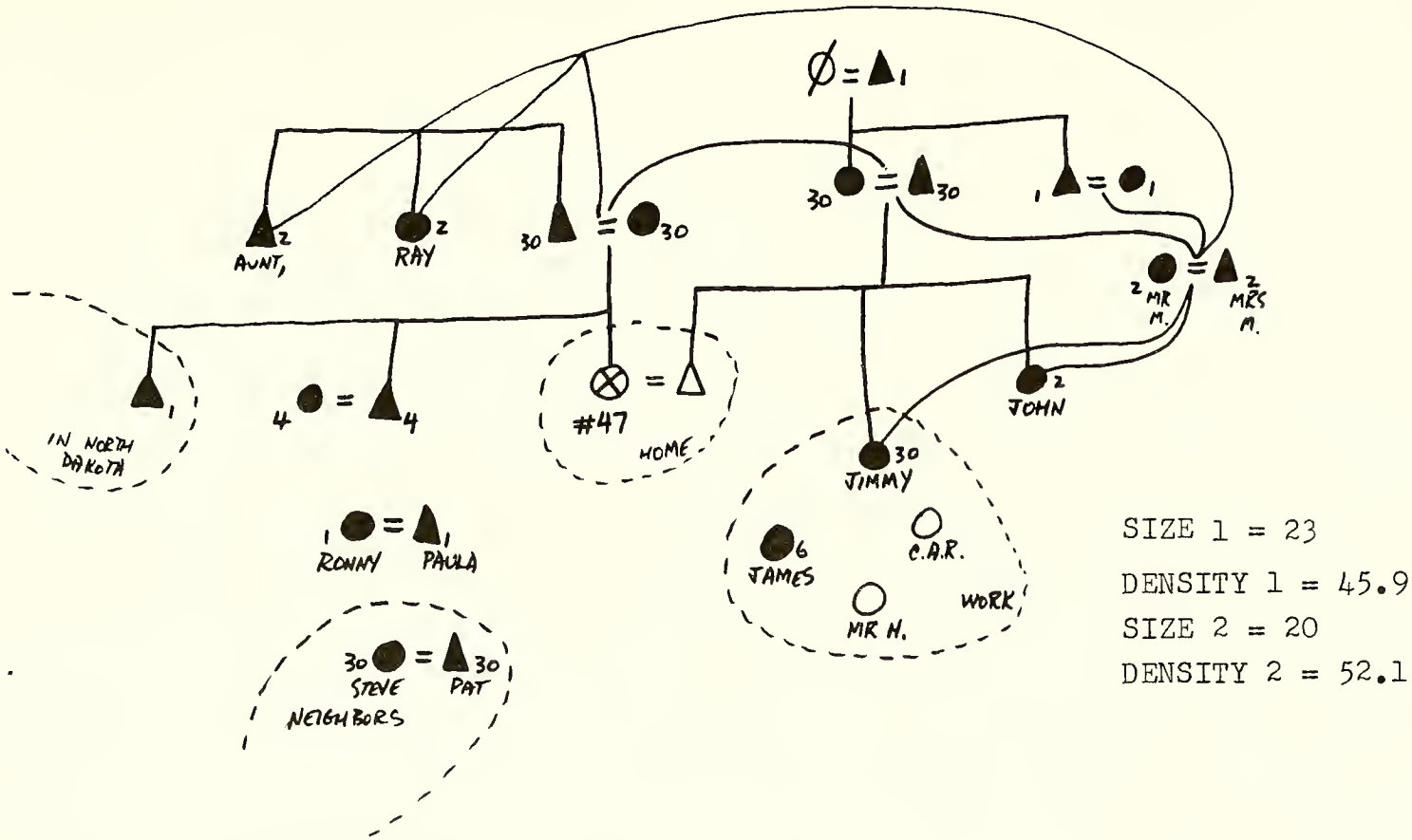


Figure 11: Social Network for Subject #47.

only two houses away from each other). The subject and his wife had few friends and most of their social life revolved around visiting one set of relatives or another - - frequently the both sets together. Strength of the ties of kinship were displayed in that the subject's brother-in-law was given a job at his dry cleaning store and the subject got a tip on a new job, and recommendation, from his wife's father.

Subject #41 (Figure 12) also had a closely knit kinship network. In fact, he reported no social friends outside of his kin. The subject's relatives were involved in his work, and other members in his network were known because of his job.

Sub-group 2: subjects who were not married but had one set of relatives who interacted with their friends.

Subject #26 (Figure 13) lived at home with his brother, sister and father. His closest friends, and confidants were his cousin (Bob) and his brother and sister. Further, his brother's fiance and her friends were included in the subject's intimate network. Another feature of the cluster 3 networks may also be noted in this example. There are very few peers (seen also in #47) and an equal or greater number of people in the intimate network were considerably older than the subject.

Subject #38's network, Figure 14, shows a lower density than is characteristic of the cluster 3 networks, yet it also demonstrates the interaction between the

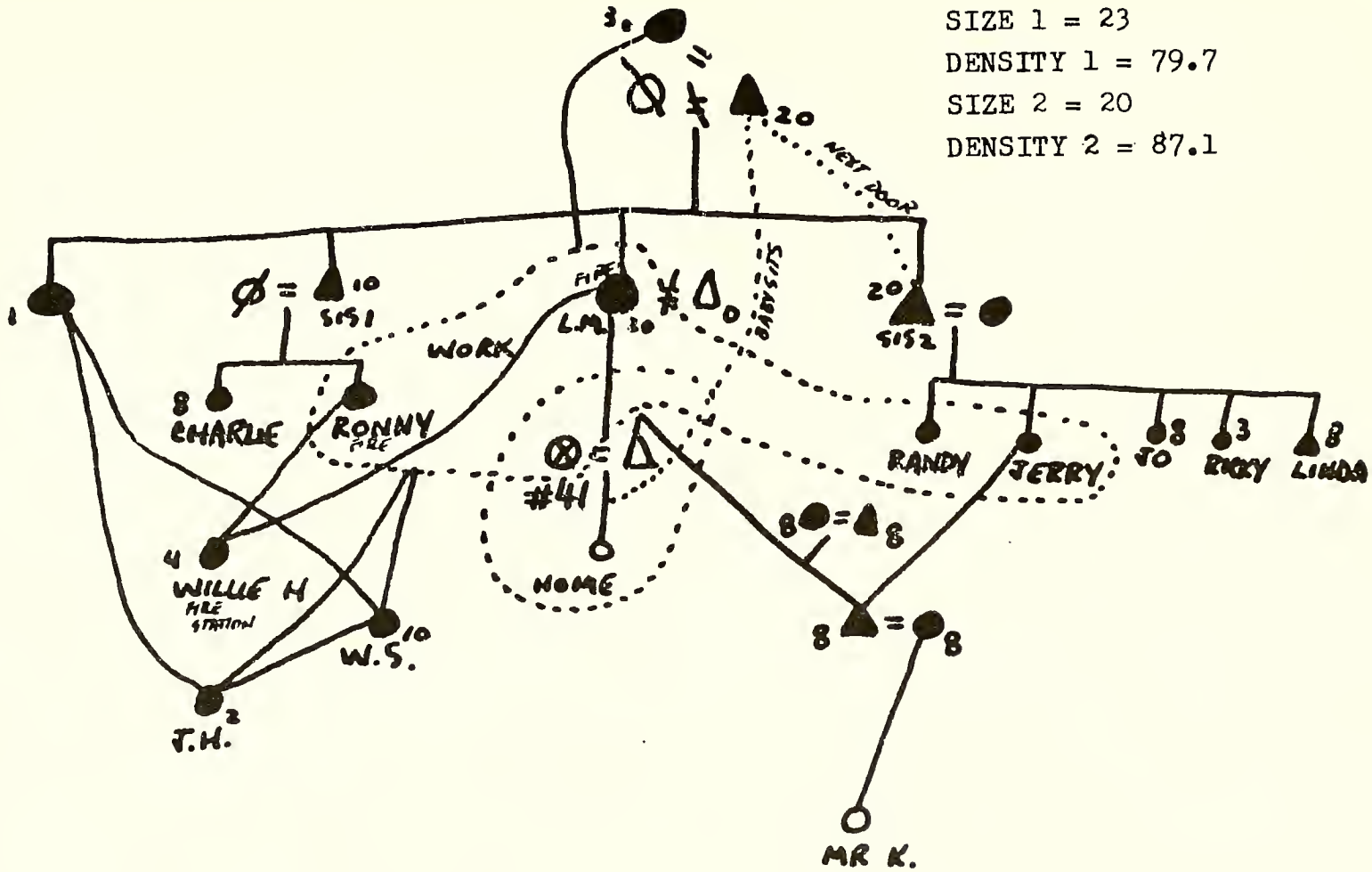
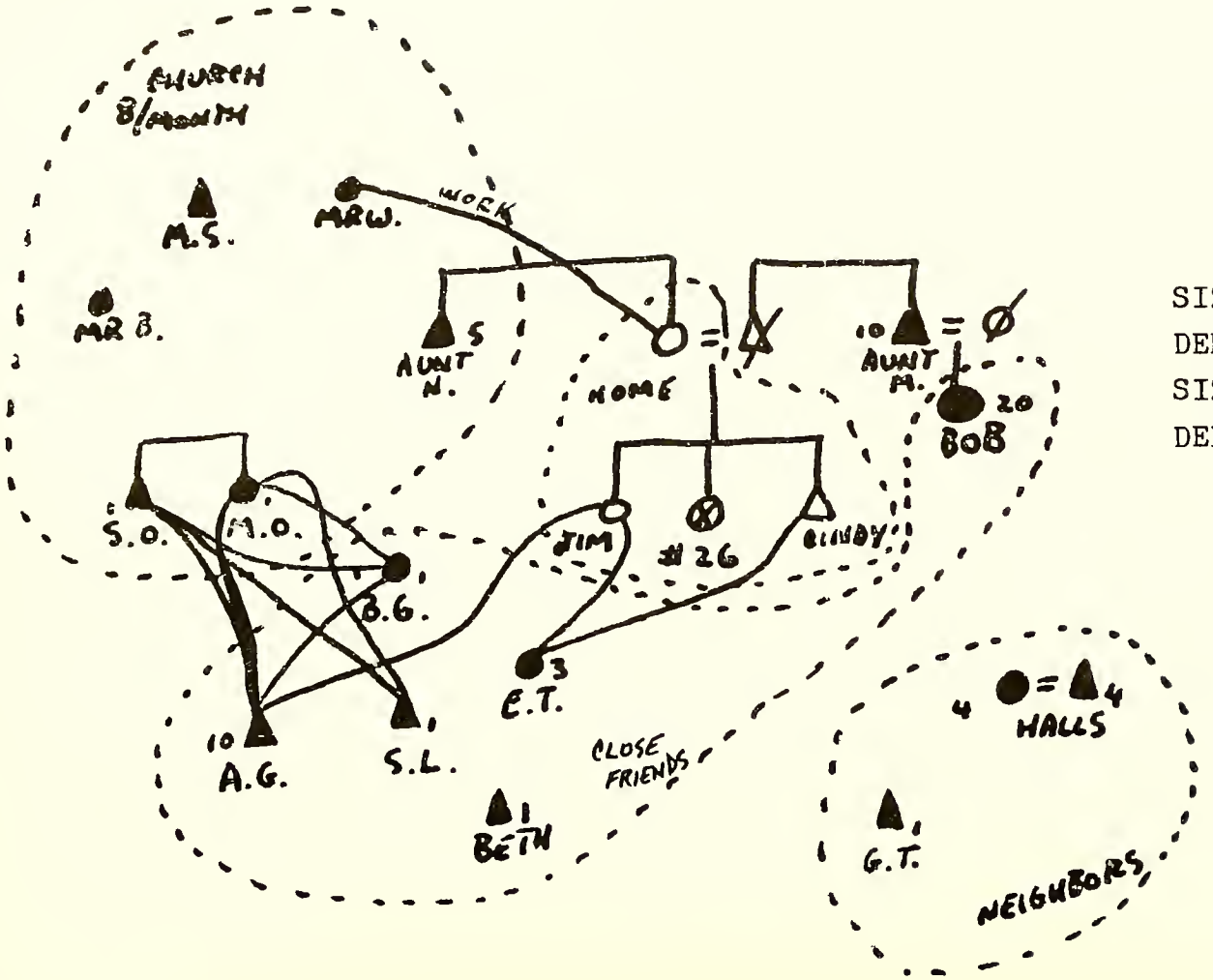


Figure 12: Social Network for Subject #41.



SIZE 1 = 19
DENSITY 1 = 42.1
SIZE 2 = 16
DENSITY 2 = 36.0

Figure 13: Social Network for Subject #26

SIZE 1 = 16
DENSITY 1 = 47.4
SIZE 2 = 15
DENSITY 2 = 40.0

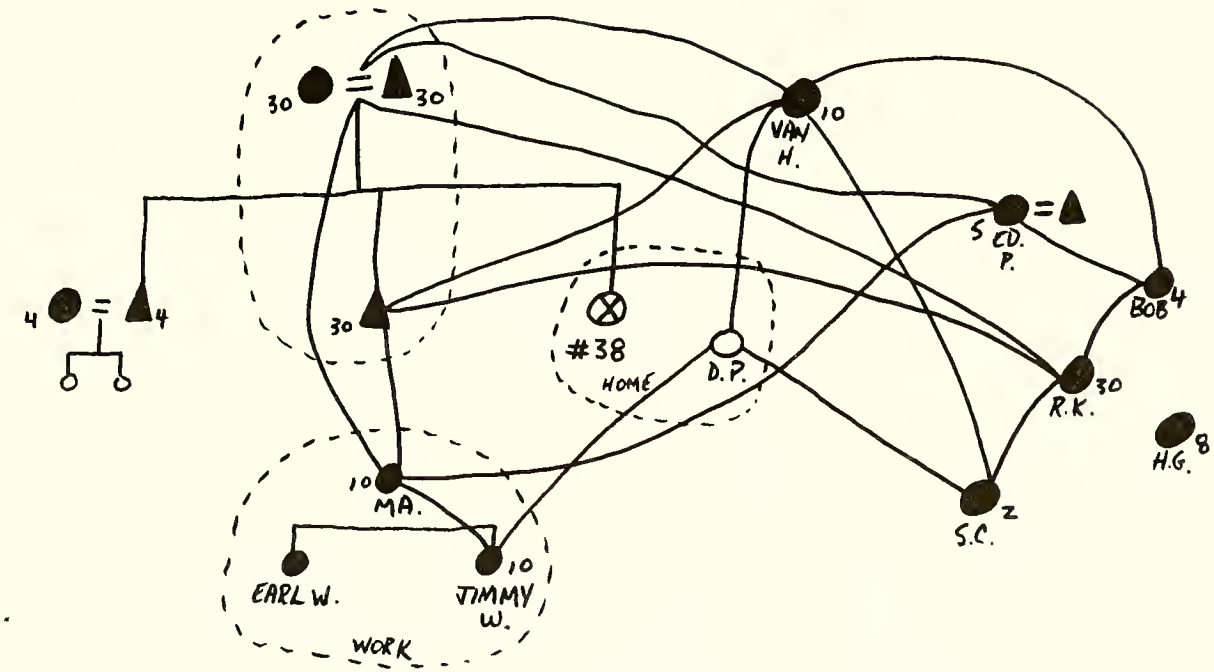


Figure 14: Social Network for Subject #38.

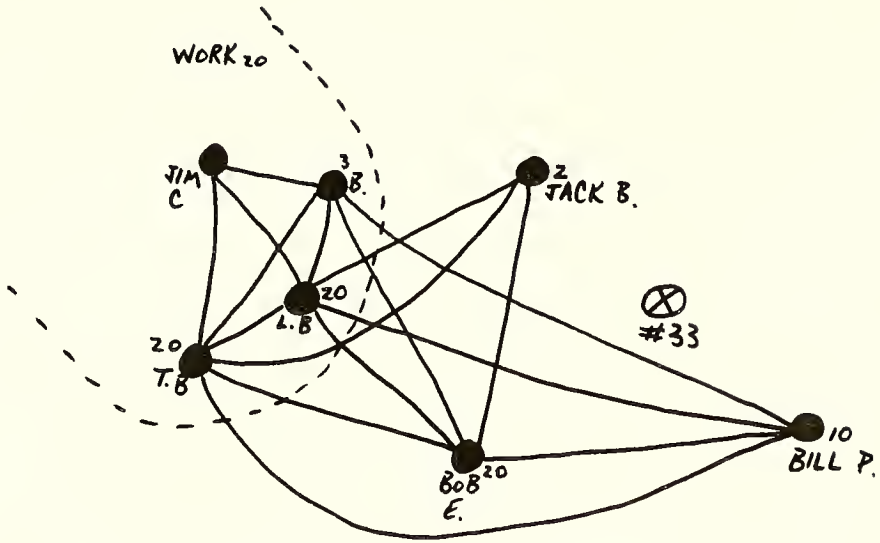
relatives and the friends. Subject #38 did not have a very large kinship network, since it consisted only of his parents and brother. Nevertheless, he visited them everyday. His parents and brother not only knew all his friends, they saw a great number of them on a voluntary basis.

Sub-group 3: subjects who were not married, had few relatives and few others.

Subject #33, whose network is shown in Figure 15, was an extreme example of this sub-group of subjects in cluster 3. For the most part these subjects were born outside of North Carolina and had few relatives except their immediate family. Subject #33's network was composed entirely of work acquaintances and friends (some of whom he worked with). Density was high; size was low.

Subject #03 (Figure 16) was another example of the same pattern. No relatives, and a great many friends and acquaintances in the extended network (generated mainly by special interests). The intimate network, however, was much smaller and composed entirely of close friends, most of knew and saw each other socially.

Subject #31 (Figure 17) is included as an example of an individual with network density scores which hit just about the average for the cluster, although the size of his network was smaller. Subject #31 reported that his network was once much larger, when he was racing motorcycles and living away from home. Now that he had returned, his network was composed almost entirely of very close



SIZE 1 = 7
DENSITY 1 = 78.6
SIZE 2 = 7
DENSITY 2 = 78.6

Figure 15: Social Network for Subject #33.

SIZE 1 = 34
DENSITY 1 = 35.1
SIZE 2 = 9
DENSITY 2 = 46.7

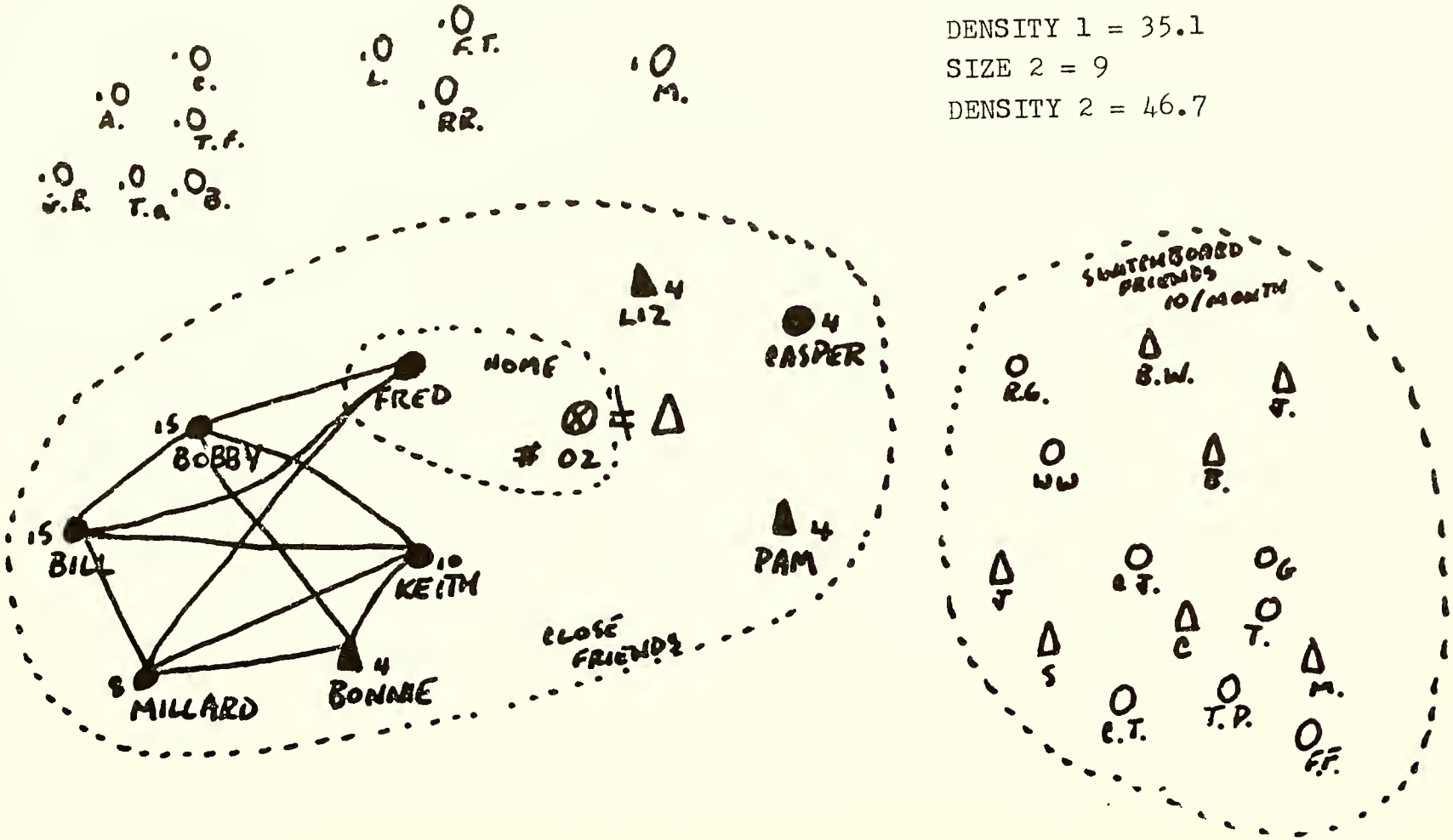
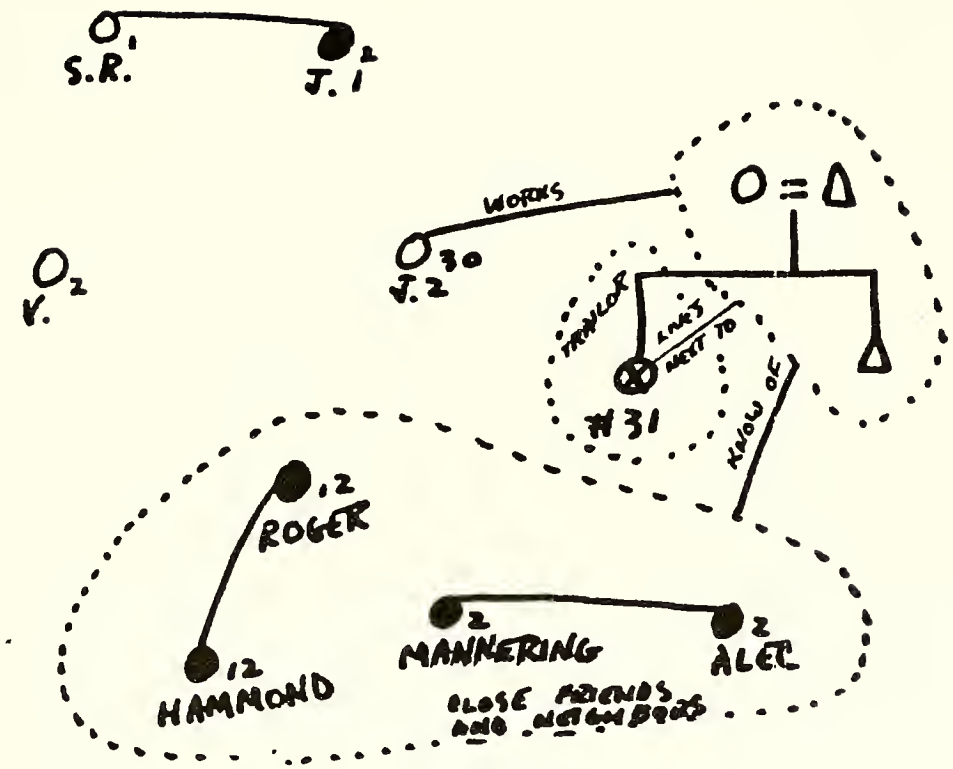


Figure 16: Social Network for Subject #02.



SIZE 1 = 11
DENSITY 1 = 37.8
SIZE 2 = 5
DENSITY 2 = 53.3

Figure 17: Social Network for Subject #31.

friends and his parents. Friends were seen separately, not as a group - - and they in turn saw each other independently of the subject.

The clusters identified, and their profiles, must be construed as only a relatively crude way of classifying social networks. Nevertheless, the three clusters represent a plausible taxonomy of social networks, or a typology, which is used in the next section to test the proposition that these distinct network clusters are also different with respect to the amount and type of help obtained in self-planned learning.

III. Social Networks and Self-Planned Learning

This section reports findings regarding (1) the degree of association between the dependent and independent variables; (2) the differences in the amount, source, and type of help received for the three network clusters identified in the previous section; and (3) the relative importance of the network characteristics as predictors of each of the dependent variables. Before reporting the results of statistical analysis of the data, a few narrative examples are presented in order to draw together the findings from the two previous sections and illustrate how the networks are actually used in self-planned learning. The examples are not randomly selected and they are not included as particular exemplars of principles; rather, they are included to provide some flesh and bones for the impersonal

numbers presented in this section.

Introductory Examples

Example 1: Subject #13. Subject #13 was an individual who had a great deal of energy and was very active both socially and in conducting his learning projects. He had to be active in order to maintain the linkage shown on the map (Figure 6). In addition to working five days a week at a radio electronics supply house (in a job obtained through his network - - girl friend's father (Dick B.) owns the store, he met with groups of people at church (15 times a month), in a band (3 times a month), and in scouts (8 times a month). These particular groups were very distinct cliques in the sense that everyone met at the same time in the same place for some particular purpose. The cliques were relatively isolated from one another, although a few individuals belonged to two groups. In addition to the regular meeting of the groups, subject #13 maintained additional contact (social) with some of the members. The other distinguishing feature of the network was the existance of a number of friends and acquaintances who did not belong to the special interest cliques, although some of them knew and saw individuals in the cliques at other times. These individuals were seen primarily because of the self-planned projects which subject #13 conducted.

One potential learning project which was excluded involved the subject's activity in the band. The members of the band continually learned new music and practiced, but

the subject was not in complete control of this learning effort and indicated that he wasn't really learning anything new. He merely applied his acquired knowledge (of guitar, piano, clarinet, and recorder) to different pieces of music.

The major learning projects involved two areas: automobiles and TV-radio electronics. One minor project which had been conducted during the previous six months involved wiring a cabin for the scout group. The subject had known nothing about electrical wiring, but asked his good friend, Johnny (who was an electrician) if he would help. The two of them proceeded to install light sockets and electrical outlets in the cabin over a three week period. The subject indicated that he thought he could probably do it on his own the next time if the occasion ever arose.

Subject #13 had been interested in automobile mechanics for some time ever since he had worked at a garage (for one year) with Johnny (before he became a licensed electrician). The specific project included in this study involved over-hauling the brakes of an automobile owned by Johnny's brother, Ronald. Subject #13 indicated that while Johnny knew a lot more about cars than either he or Ronald did (and, in fact, supplied technical assistance when they had questions), Johnny did not particularly like to help or work with his brother. The two, subject #13 and Ronald worked from an automobile manual for the car.

They both owned some tools, but also had to buy some new ones. Assistance obtaining tools and parts was received from salesmen at Sears and a salesman at a local automobile supply house. Throughout the project, Ronald's brother, Johnny, offered some suggestions. However, when they ran into major difficulties, subject #13 suggested that they get some expert advice from two mechanics who he had worked with before (Jack 1 and Jack 2). The project was finally completed with the help from five individuals: 2 provided help once or twice (the salesmen) and 3 provided more sustained help (Johnny, Jack 1 and Jack 2).

The second major project subject #13 concerned subject #13's career goals. When the subject had graduated from high school, he decided that despite pressure from his parents to attend college (as his brother did), he would work a while and try to figure out exactly what he wanted to learn in college. His major interest was in radio-TV electronics and audio equipment. While in high school he had installed a stereo system in his car and had built an amplifier. Over time, through these projects, he had included in his network a number of individuals who shared his interest. Among them were electronics experts at his job (particularly Murphey), a friend who worked at a local radio station (Glenn), a TV repairman who was currently going to Duke (Jimmy TV), and a repairman who serviced stereo systems (John).

The most recent project involved wiring a light readout on his stereo amplifier. Subject #13 worked on electronic circuiting in his spare time at work, getting advice from Murphey, and drawing circuits on envelopes. He sought the advice of Jimmy (at work), Jimmy TV and John, even before beginning the project. He acquired materials and tools at his store and used his expert-friends during the actual assemblage of the circuits.

The help provided for the specific teaching tasks were recorded. Subject #13 indicated that he alone had decided what to learn, where to learn, and how much money to spend. He never considered how long the project might last and never had to deal with any lack of desire on his own part. Although he did have doubts about his success at certain points, he was able to deal with them by himself. Murphey and Jimmy at his job were very important in suggesting the equipment and materials which were needed for the project. Jimmy TV, John and Murphey were all used in the planning activities when the subject was attempting to formulate a plan of action or strategy for completing the project. These three were also helpful during the project when he ran into specific difficulties. Finally, subject #13 indicated that he had been able to informally gauge his progress (or estimate his level of knowledge) throughout the project by talking to his friends, Jimmy TV and John. At the beginning of the project, they knew as little as he did about how to proceed. At the

end of the project, the subject indicated that he was confident that, for this particular task and problem, he knew a lot more than they did.

Example 2: Subject #42. An individual has to be fairly active to maintain the large networks which are common in cluster 1. However, the activity of maintaining the linkages within the network may have little to do with learning in general, or self-planned projects. A case in point was the large network of subject #42 (Figure 7). Most of the linkages in this network existed on the basis of social activity (including those with relatives). Further, in contrast to subject #13 there were not several large special interest cliques. Subject #42 did, however, meet regularly (once a month) with all of the relatives on his side at a dinner held at his mother's.

The subject was an electrician, but his major interest and learning project, involved developing a community recreation program for his old neighborhood (which he had since left to take an apartment across town). Most of the help he obtained for this project came from childhood friends from his old neighborhood (Mike P. and David R.) and his father. He had recently been involved in setting up and umpiring a peewee baseball league. He studied and learned the rules with his father. At the time of the interview, the subject was involved with David R. and Mike P. in investigating other recreation

programs since they had plans to build a football field, tennis court, and eventually a gym. He had recently used his skills as an electrician to wire the baseball field for night baseball and had called upon several friends from work to help (though this was not a learning project).

Example 3: Subject #17. Subject #17 was born outside of North Carolina, but had lived in the area for 10 years. Like subject #13, after graduating from high school, he was unsure of exactly why he should go to any school, or what he was interested in. He decided to suspend that decision (with his parent's approval) and get a job in order to get money so that he could go to school where he wanted and not merely where he could. Unlike subject #13, subject #17's work had nothing to do with anything he was interested in as a career. He worked as a construction laborer. He said he enjoyed the work (and the use of tools), but he never saw any of the work group outside of working hours.

Subject #17 had one moderately sized social group (clique) of close friends who he saw regularly (Figure 8). The clique was in large measure separate from his other acquaintances who were seen regularly because of interests they had in common. Subject #17 was very interested in a number of outdoor activities such as scuba diving, camping, and rock climbing. These interests had led him to become friendly with several people who had more expertise than he did and who he called upon for information and

assistance from time to time. One of his major outdoor learning projects at the time of the interview was parachute jumping. Help was provided by experts who he saw every two weeks and books which he read voraciously. He had interested a member of his social group (Elizabeth) in parachute jumping.

The other major project conducted by subject #17 had to do with his career goals in photography. While still in high school he had worked part time for the biology department of the local university, developing slides. He had also formed a photography club which met regularly twice a month to discuss current developments in photography. At the time of the interview they were planning to produce a film. Subject #17 was particularly interested in color processing and still life photography. He gained a great deal of help selecting topics of study from an expert (Burt). He learned about the technical details of color developing from John (in the photography club). He was evaluating his own ability to two ways: by discussing photography and teaching the basic techniques to one of his friends (Fred), and by receiving expert criticism of his photographs from his father. Both parents supplied encouragement and helped him to obtain equipment.

<u>Example 4</u>: <u>Subject #25</u>. Subject #25 went to a junior college for six months and then quit because "it just wasn't what I wanted to do". He was extremely active in a number of learning activities (one of which was the

major project in music, sketched out in section one of this chapter). At the time of the interview he had taken a job at a local radio station, checking the transmitter, and was primarily concerned with learning enough radio-electronics to get a second class license.

Subject #25 had many friends (Figure 9). However, unlike subjects #17 and #13, he did not meet with them regularly at any one particular time. His contacts with people in his network were usually with individual people who he saw sometimes on the basis of shared interests (music, electronics), sometimes just socially. Most of the people in the network (except for those at Big Walley's, Vickers and the radio station) were seen both as social friends and because of mutual interests.

Subject #25's interest in radio-electronics had begun several years before the interview. One of his close friends (Ray A.) who did not know the others in the network, got both the subject and his brother interested in radios. Over the years, subject #25 met an older man (W4pey) who gave him some ham equipment. He became so proficient at repairing equipment (with his brother's help) that he worked as a part time consultant repairman for several local audio-stereo stores. He kept a log of symptoms and remedies for the problems he had encountered. When asked what he did when he ran up against something new, he said he would probably go to his brother.

Subject #25 was planning to start a small business

with his brother. They were planning to invent and market several projects (gas gauge and strobe lights for model planes). They usually worked on their ideas independently and then pooled whatever they learned. Occasionally when both were stumped, Ray A (who repairs computers) gave them some suggestions.

In addition to these activities, at the time of the interview, subject #25 was primarily involved in a self-planned project designed to gain enough knowledge to pass a second class radio license examination. He received a great deal of sustained assistance from his family (Dan: technical advice since he had already passed the examination; his mother and father: encouragement and general emotional support). He had worked his way through several programmed texts, receiving help on the difficult parts, and at the same time evaluating his knowledge, from one expert (Haywood) who visited the radio station to repair the transmitter, and from one fellow learner (D.W.) who also worked at the radio station. Subject #25 had also evaluated his progress by the very ingenious method of sending for the first class license test and taking it so he could gauge how much more he had to learn for the second class license.

Thus far, the examples presented suggest that some significant distinctions should be made concerning the notion of some all pervading peer group culture of young adults. Certainly, as mentioned in the section describing

the networks, relatives appeared to play a less important role for these young adults than friends and acquaintances. Nevertheless, quite often the subjects had two significant peer groups (and sometimes more). One peer group might be accurately described as the social group: friends seen for the purposes of parties, dates, and general comradship. A second group, however, was apparent in the discussion of the learning projects: individuals known and seen primarily because of shared interests in the learning project. These two groups of friends and acquaintances did not consistantly overlap. Help was often received from friends and friend-experts, but often these individuals were not the social friends in the voluntary social network. In two networks previously discussed (#13 and #17) a closely knit clique of friends existed, but help for the learning projects was obtained outside of this social group.

Another example of this behavior was illustrated by subject #09 (Figure 18). The subject saw a closely knit group of friends, primarily old high school acquaintances, regularly. They were, the subject reported, a lot more important to him than the 25 - 50 relatives he occasionally saw (not voluntarily: relatives visited his house). The subject was engaged quite actively in a work project (electrician's apprentice) which he pursued outside of his everyday job hours. However, none of the individuals in the close knit friendship group were even approached for

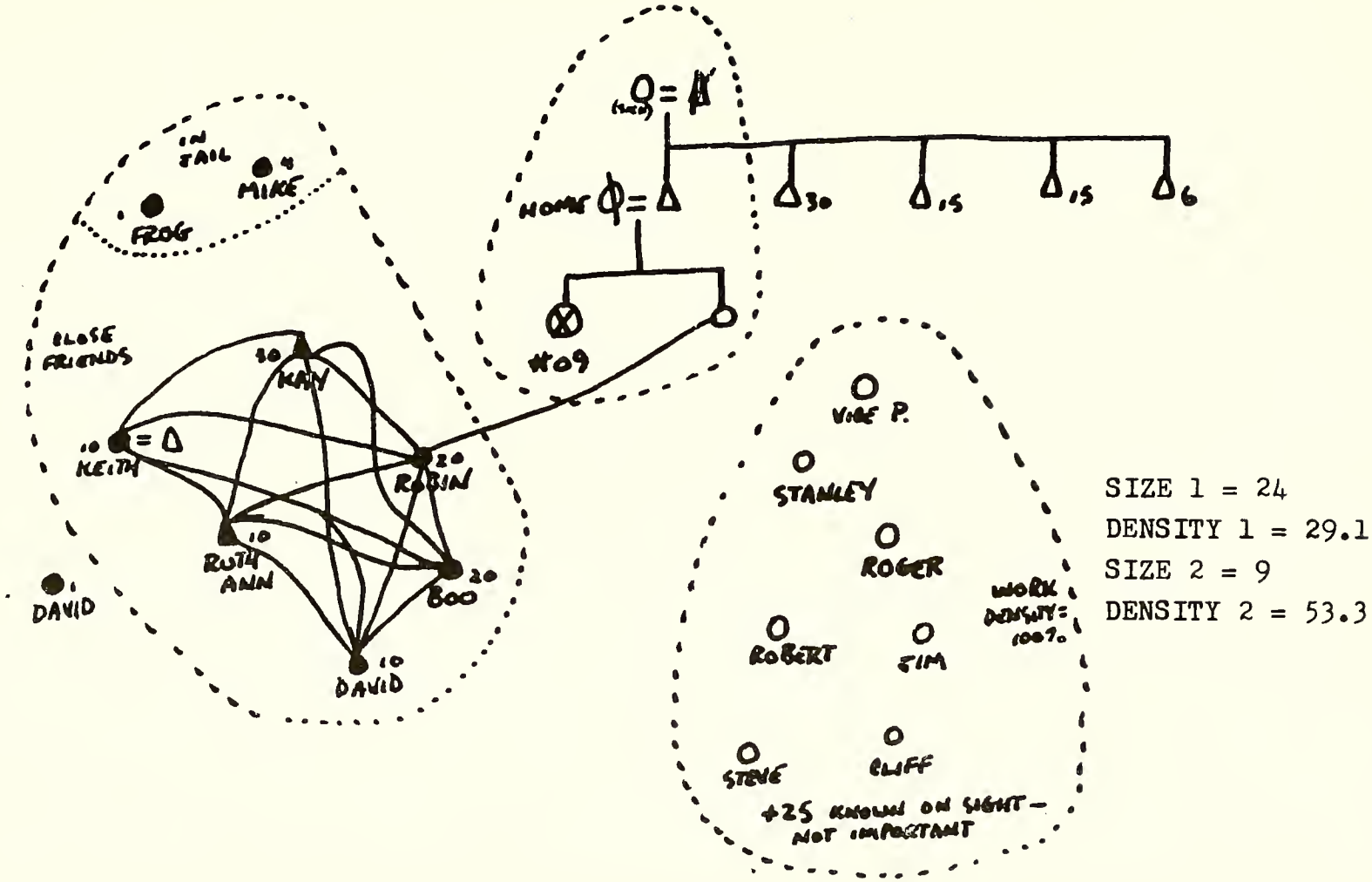


Figure 18: Social Network of Subject #09.

information, assistance, or even encouragement. No encouragement was asked or received from his friends because "they're not interested, that's a different group".

It is possible for one individual to have several cliques of friends, relatives and others. The norms and values of each of these cliques, however, may not be congruent. An individual may have to conform to the social pressure of a number of divergent groups depending upon the exigencies of the situation. Some individuals, however, pick and choose (construct) part of their networks on the basis of those norms and values which are of vital importance to themselves. This suggests a less deterministic view of the role of social networks. It places the individual in a more active role, with the ability to construct his environment, at least in those portions of the network which are not assigned to him by birth (relatives) or economic necessity (work). An extreme example of network construction may be seen in the map of subject #31 (Figure 15). At one time, when he was just out of high school, and racing motorcycles much to his parents' dismay, his network included over 50 people. Since returning home, his network has shrunk to 11 people. Most of those individuals, outside of his immediate family, were people who share his many interests (nature, electronics, mechanics, running a farm, carpentry-building a house, and manufacturing fiberglass kyacks) and who were called upon for information, assistance, and

social friendship.

The fact that some subjects had cliques of individuals in their networks, linked to the subject on the basis of very different interests, suggested that loosely knit networks might be able to provide a greater variety of help than the closely knit networks. If an individual had a group of friends or relatives who were seen solely on the basis of social interaction (not special interests), it would appear more difficult for him to gain assistance for a particular learning project which he alone was interested in. More than likely he will have established other contacts on the basis of this interest (as did #13, #17, and #25) and his network would become less closely knit. Sustained help could come out of a closely knit network of other learners (see example 5, below) but special interests and learning projects are rarely the only basis for network composition (as they are for subject's #33 and #31).

In section I of this chapter it was reported that relatives were not frequently used as sources of help. It was suggested that this finding was in part due to life cycle considerations and in part due to the nature of the learning projects. Kinship ties were invoked for personal problems and emergencies, where the basis for and assistance was one of concern and obligation. Hence, it was no surprise to find that several subjects had obtained their jobs through the kinship sectors of their networks,

although they did not use kin for help while they were conducting their learning projects. Friendship ties, invoked and established on the basis of mutual interests and consensus, were more important in obtaining help and assistance in self-planned learning. However, when the network had a closely knit kinship sector which also shared the learning interests of one of its members, then relatives did provide assistance as illustrated in example 5 (subject #41).

Example 5: Subject #41. Subject #41 had a very closely knit network composed primarily of relatives (Figure 12). In fact, there were no individuals seen socially in the intimate network who were not relatives. The subject's learning project was related to his work and his work formed one of the major bonds among his relatives, and his few acquaintances. The subject ran a family business (an automobile body shop) started by his father. His father worked in the business part time, but worked 40 hours a week at a fire station. The subject's brother also ran a major automobile body shop in the city. When the subject's wife went to work, she left their daughter with the subject's grandmother. The subject's grandfather, who was retired, usually spent every day around the body shop. The two other individuals who worked at the body shop were his cousins (Randy and Terry).

Subject #41's major project was building a car. In the course of conducting this learning project he used his

network in a variety of ways. First, he bought the body for the car from a friend of his wife's sister's husband. A few months later, his wife gave him the transmission as a Christmas present. His father convinced a fellow fireman to give the subject an engine from a wrecked car, in return for future work at the body shop. In return for painting the truck of Wayne S. (who owned a local automobile part shop), the subject received expert help in rebuilding the engine. He then obtained the assistance of a cousin (Charlie) whose brother worked with the subject's father at the fire station, and another cousin (Randy) who worked with him at the body shop. Together they put the car together. The entire project was an example of how a kinship network can be used if the relatives in the network share learning interests, and, in this case, are also experts.

Association Between the Variables

The degree of association between the dependent and independent variables was assessed by examining Product-Moment and Canonical correlations. Since the composition of the networks is represented by the transformed variables used in the cluster analysis (EIG 1, EIG 2, EIG 4, EIG 5), the interpretation of correlation coefficients is not without ambiguity. The transformed scores for each subject contain a complex mixture of the original variables (%RELATIVE (1), %FRIENDS (1), % OTHERS (2), %RELATIVES (2), %FRIENDS (2), and %OTHERS (2)). Consequently, for the purpose of discussion, the transformed scores will be

treated as the single network characteristic COMPOSITION.

Product-Moment Correlations. Table 14 summarizes the individual correlations between single pairs of variables.

Table 14 shows that the number of helpers a learner used was significantly related to one of the composition variables of the extended network (EIG 2) and both DENSITY 1 and DENSITY 2. Oddly enough, the size of the extended or intimate network was not related to the total number of helpers the learner received assistance from. The negative correlation between the density scores and the number of helpers indicated that the lower the density of the extended and intimate network, the more help a self-learner obtained.

One of the composition variables from the intimate network (EIG 5) was significantly related to the number of helpers who provided sustained help(#HELPMO). #HELPMO was more strongly associated with the density of both the extended and intimate networks. The negative relationships between density measures and #HELPMO indicated that the less dense networks were associated with greater numbers of helpers who provided sustained help.

#HELPMO had very little association with any of the network properties used in this study, except one composition measure from the extended network (EIG 2).

Insofar as the source of help in the self-planned learning, the proportion of the helpers who were relatives

TABLE 14

Product-Moment Correlations Between 8 Network Variables and Variables Related to the Amount, Source, and Type of Help Received

	#HELPERS	#HELPMO	# HELPO	%HELPERS-R	%HELPERS-F	%HELPERS-O
SIZE 1	.08	.09	.03	-.10	.30*	-.25
SIZE 2	.02	.08	-.05	-.05	.40***	-.40***
DENSITY 1	-.33**	-.34**	-.13	.21	.03	-.21
DENSITY 2	-.33**	-.36***	-.11	.22	-.26	.11
EIG 1	-.06	-.09	.02	-.34**	.37***	-.13
EIG 4	-.10	.03	-.20	.54***	-.13	-.32*
EIG 2	-.37***	-.26	-.29*	.42***	-.13	-.32*
EIG 5	.24	.29*	.05	-.17	.13	.00

* $p < .05$

** $p < .01$

*** $p < .001$

was significantly associated with both composition measures of the extended network (EIG 1, EIG 2) and one composition measure from the intimate network (EIG 4). Such a finding was expected and appeared to be almost intuitively obvious: the composition of the pool of resources is related to the source of help. This expected relationship, however, was not as strong for the proportion of the helpers who were friends and others. The proportion of the helpers who were friends was significantly related to only one measure of composition (EIG 1: in the extended network). A higher association was found between the size of the networks (both SIZE 2 and SIZE 1) and %HELPERS-F. Positive correlations between the measures of size and %HELPERS-F indicated that the larger the network, the greater the proportion of the helpers who were friends. With respect to the %HELPERS-OTHERS, significant associations were found with SIZE 2 and EIG 4.

Canonical Correlation Analysis. Tables 15 and 16 show the optimum weighting of variables within each set of network and help which will produce the maximum amount of correlation between linear functions of the two groups of variables. Wilk's Lambda criterion tests the null hypothesis that there was no residual linear association between the two sets of variables after the canonical variates have been removed. The overall significance test of Wilk's Lambda is according to Bartlett's chi-square approximation.

TABLE 15

Results of Canonical Analysis for the First Two Sets of Network and Helping Variables

Canonical Correlation	Wilk's Lambda	Chi Square	df.	p<
.697	.236	62.852	32	.001

Independent Variables	Canonical Coefficient	Standardized Weights	Dependent Variables	Canonical Coefficient	Standardized Weights
SIZE 2	-.0997	-11.5538	#HELPERS	0.287	1.4350
DENSITY 2	-.0452	-9.1453	#HELPMO	0.098	.3851
EIG 4	-0.343	-13.1311	%HELPERS-F	1.131	29.6774
EIG 5	0.228	5.5943	%HELPERS-O	1.050	24.8430
SIZE 1	0.826	9.5722			
DENSITY 1	-0.217	-3.3303			
EIG 1	0.598	17.6293			
EIG 2	-0.095	-2.2621			

Both Table 15 and Table 16 reveal that the set of network characteristics was significantly, but moderately, related to the set of helping variables. Table 15 shows that among the dependent variables, those given the greatest weight in composing the linear combination were measures of the source of help (%HELPERS-F and %HELPERS-O). Amount and type of help were not too influential. Among the network characteristics, two composition variables (EIG 1 and EIG 4) one from the extended and one from the intimate network, were given the greatest weight in the linear combination. These composition variables were followed by SIZE 2, SIZE 1, and DENSITY 2. Table 15 shows a similar pattern and structure with two composition variables (EIG 1 and EIG 4) followed by SIZE 1 and SIZE 2 given the greatest weight in forming the linear combination of the network variables which had the strongest correlation with the linear combination of the helping variables (with %HELPERS-R given the greatest weight).

Discussion. Table 14 revealed some associations which were quite surprising. First, it was expected that the size of the pool of resources would be significantly associated with the amount of help an individual received. This is not the case. Stronger associations were found with the composition of the extended network, and the extent of interrelationship between members of both the extended and intimate networks (the density measures).

TABLE 16

Results of Canonical Analysis for the Second Two Sets of Network and Helping Variables

Canonical Correlation	Wilk's Lambda	Chi Square	df	p<
.672	.482	32.448	16	.01

Independent Variables	Canonical Coefficient	Standardized Weights	Dependent Variables	Canonical Coefficient	Standardized Weights
SIZE 2	-1.132	-13.1183	#HELPO	0.195	.5870
DENSITY 2	-0.423	-8.5585	%HELPERS-R	-0.941	-18.9706
EIG 4	-0.464	-17.7634			
EIG 5	0.234	5.7416			
SIZE 1	0.990	11.4727			
DENSITY 1	-0.131	-2.0105			
EIG 1	0.617	18.1894			
EIG 2	0.016	.3810			

Second, it appeared likely that the composition of the networks would be strongly associated with the source of the help. This was true, but size and density of the networks were also strongly related to the source of help. Surprisingly, the size of the intimate network was more strongly associated with both %HELPERS-FRIENDS and %HELPERS-OTHERS. The larger the intimate network, the greater the proportion of the helpers who were friends, and the smaller the proportion of the helpers who were others. Of further interest is the finding that the density of the intimate network was more strongly related to the proportion of the helpers who were friends than were either of the two composition measures of the intimate network.

The results of the canonical correlation analysis are more difficult to interpret. The analysis was employed in response to the question "are network characteristics taken as a set related to measures of help, taken as a set?". The answer to this question is yes: the set of ten network properties was significantly associated with the set of six variables which delimited the amount, source, and type of help received by self-learners.

Though correlation analysis reveals something about the structure of the variables, and their interrelationships, the next analysis, reported below attempted to speak more

specifically about the entire social network. Differences in the scores on the six dependent variables for each of the three clusters of network properties, identified in the previous section, were compared using a multivariate analysis of variance.

Cluster Differences

Multivariate analysis of variance was used to test the hypothesis of no difference between the three clusters on the 6 dependent variables. The means and standard deviations on the helping variables for the three clusters are presented in Table 17 and Table 19. Results of the multivariate and univariate significance tests for each of these analyses are presented in Table 18 and Table 20. In both cases, the MANOVA analysis between the three network clusters on the helping variables did not reveal a significant multiple F; indicating that the mean scores for the clusters on the helping variables did not differ significantly from each other. Univariate tests revealed that the groups approached significant differences on the variables #HELPMO, and #HELPERS-FRIENDS; but since the multivariate test was not significant, multiple comparisons were not conducted.

Discussion. Reporting insignificant findings is often a thankless and unrewarding task. Nevertheless the purpose of this investigation was not so much to find statistically significant relationships as to report what relationships

TABLE 17

Means and Standard Deviations for 3 Clusters on the First Set of Helping Variables (#HELPERS, #HELPMO, %HELPERS-FRIENDS, %HELPERS-OTHERS)

Clusters		#HELPERS	#HELPMO	%HELPERS-F	%HELPERS-O
1	M	7.40	4.40	63.40	18.32
(N=5)	SD	1.82	1.52	10.13	12.96
2	M	12.10	8.20	50.16	36.73
(N=10)	SD	6.33	5.63	28.33	24.52
3	M	9.00	5.37	38.45	38.98
(N=35)	SD	4.72	3.39	25.90	23.94
TOTAL	M	9.46	5.84	43.29	36.46
(N=50)	SD	5.00	3.94	26.24	23.66

TABLE 18

MANOVA: First Set of Helping Variables
Multivariate Tests of Significance Using Wilk's Lambda Criterion

N=50

General Analysis $F(8,88) = 1.53$ $p < .144$

Univariate F Tests Variable	$F(2,47)$	$p <$
#HELPERS	2.045	0.141
#HELPMO	2.530	.090
%HELPERS-F	2.559	.088
%HELPERS-O	1.717	.191

TABLE 19

Means and Standard Deviations for 3 Clusters on the Second Set of Helping Variables (#HELPERS, #HELPO, %HELPERS-RELATIVES, %HELPERS-FRIENDS)

Clusters		#HELPERS	#HELPMO	%HELPERS-R	%HELPERS-F
1	M	7.40	3.20	18.28	63.40
(N=5)	SD	1.82	1.10	14.64	10.13
2	M	12.10	4.30	13.12	50.16
(N=10)	SD	6.33	3.40	9.91	28.33
3	M	9.00	3.71	22.58	38.45
(N=35)	SD	4.72	3.11	22.66	25.90
TOTAL	M	9.46	3.78	20.26	43.29
(N=50)	SD	5.00	3.01	20.16	26.24

TABLE 20

MANOVA: Second Set of Helping Variables
Multivariate Tests of Significance Using Wilk's Lambda Criterion
N=50

General Analysis $F(8,88)=1.525$ $p < .144$

Univariate F Tests

Variable	F(2,47)	p<
#HELPERS	2.045	.141
#H#LPO	0.243	.785
%HELPERS-R	0.878	.422
%HELPERS-F	2.559	.088

existed using the most appropriate analysis which could be devised. If the value of this study rested upon reporting significant differences between the clusters, the five cluster solution (relegated to Appendix III), where the multivariate analysis of variance did reveal a statistically significant multiple F on these same helping variables, would have been reported in the main body of the thesis, even though it appeared to be a less satisfactory clustering solution for the data. Since a decision was made to accept the three cluster solution as the most appropriate, the task is now to interpret the findings. Specifically, how is it possible that single network properties were significantly related to single helping variables (as shown in the correlation matrix) and network properties taken as a set were statistically significantly related to the helping variables taken as a set (as shown in the canonical correlation analysis), but there were not statistically significant differences between the three clusters of network properties on the helping variables? The answer to this question is by no means an easy one, but there are several plausible explanations.

One statistical explanation lies in the difference between canonical correlation analysis and multivariate analysis of variance. Canonical correlations indicate the optimum linear combinations of the two sets of variables achieving the highest correlation, using all

the data for all the measures of the two sets of variables for the entire sample. Some of the data are lost in the multivariate analysis of variance where the eight measures of network properties are compressed into only three groups (the clusters). Consequently, some of the variance in the network properties is lost in MANOVA. One might expect that with a larger number of groups, and concommitantly greater variance between the groups on the network properties, the likelihood of significant differences would be increased. This, in fact, appears to be the case, as may be seen in the analysis of the five cluster solution presented in Appendix II, where the very large amorphous cluster 3 (N=35) has been split up into three different clusters.

The existance of the five cluster solution also suggests another plausible explanation for the lack of significant findings with three clusters. It may well be that the 50 subjects of this investigation are not enough to reflect the significant clusters in the population. A random selection of subjects is not necessarily the best way to go about selecting a sample if one's purpose is to identify all the distinguishable clusters in a certain population. It is possible that certain clusters which are under-represented in the sample, are completely lost and either submerged into larger clusters because of their few representatives in the sample, or entirely unrepresented by anyone in the sample selected.

It is for this reason that the five cluster solution is included in the appendix to this investigation. Should another study with a larger sample identify additional clusters of network properties, then the findings of the five cluster solution would be more relevant.

A third possibility, which is not speculative, is that the variables most important in generating the clusters, were not the most important variables in establishing the significant canonical correlations between the two sets. Although a comparison between cluster findings and canonical analysis is difficult because the statistical processes and purposes are entirely different, it does appear that the most heavily weighted network properties in the two analysis are different. If one looks at the two discriminant functions which were reported as giving the maximum discrimination between the three clusters, one can see that the best discriminator was the transformed composition variable called EIG 5. In fact, in the first set of discriminant functions, EIG 5 was given five times the standardized weight as the next most important variables (EIG 2 and DENSITY 2). Neither EIG 5 nor EIG 2 were given high weights in the construction of the linear combination of network properties forming any of the significant canonical correlations. Similarly, in the second set of discriminant functions for the clustering procedure, the two variables given the highest weights were SIZE 1 and SIZE 2. Neither of these variables

achieved high canonical coefficient weights in establishing the best linear combination of network properties correlated with the best linear combination of the helping variables. What appears to have happened, is that the most important criteria for establishing the network clusters were variables which were not the most important in establishing the best linear combination of network properties in order to achieve the maximum canonical correlation with the set of helping variables.

As stated in Chapter III, though not eagerly anticipated it appeared possible that the results of the multivariate analysis of variance between the clusters of network properties would not be statistically significant. Such a finding, it was reasoned, could be that the set of network variables selected for study, and used in the cluster analysis did not contain the best predictors of the amount, source, and type of help the subjects received in self-planned learning. If this were the case, the next step in future research would be to identify the relevant variables. Since this study did provide data amenable to this type of analysis, for the variables specified, the relative importance of the network variable was assessed through step-wise multiple regression analysis.

Network Predictors

The results of the step-wise multiple regression of network factors related to each of the helping variables are reported in Table 21.

TABLE 21

Step-Wise Multiple Regression of Network Variables Most Highly Related to Each Helping Variable
N=50

Analysis	Helping Variable (Criterion)	Network Variables (Predictors)	Zero Order Correlation	Multiple Correlation	S.E. Estimate	F	Cumulative Variance	Beta (Slope)
1	#HELPERS	EIG 2	-.37	.37	4.70	7.56**	.14	-.33**
		DENSITY 2	-.33	.47	4.51	6.66**	.22	-.29**
2	#HELPO	EIG 2	-.29	.29	2.91	4.34*	.08	-.47**
		EIG 5	.05	.35	2.87	3.28*	.12	-.27 n.s.
3	#HELPMO	DENSITY 2	-.36	.36	3.70	7.30**	.13	-.34*
		EIG 2	-.26	.42	3.64	5.11**	.18	-.22 n.s.
4	%HELPERS-RELATIVES	EIG 4	.54	.54	17.09	20.19**	.29	.61**
		DENSITY 2	.22	.63	15.86	16.09**	.40	.34**
5	%HELPERS-FRIENDS	SIZE 2	.40	.40	24.36	8.87**	.16	.28*
		EIG 1	.37	.48	23.44	7.20**	.23	.40**
		EIG 5	.13	.54	22.72	6.46**	.29	.27*
6	%HELPERS-OTHERS	SIZE 2	-.40	.40	21.92	9.08**	.16	-.40**
		DENSITY 1	-.21	.48	21.14	7.17**	.23	-.29*
		EIG 4	-.32	.56	20.20	7.07**	.31	-.29*

*$p < .05$

**$p < .01$

#HELPERS. Two of the network properties were significant predictors of #HELPERS: a composition variable from the extended net (EIG 2) and the density of the intimate network.

#HELPO. The two significant predictors of #HELPO were both composition variables. It should be noted, however, that both composition variables (EIG 2 and EIG 5) only accounted for .12 of the variance in the scores on #HELPO. Consequently, it may be said that none of the ten network variables used in this study were very good predictors of #HELPO. This could mean that network characteristics are not associated with help obtained once or twice, or it could indicate that other network properties which were not used in this study should be analyzed.

#HELPMO. There were two significant predictors of #HELPMO (sustained help). They are the same two which were the best predictors of #HELPERS, only in the reverse order of importance. DENSITY 2 was the most important predictor of #HELPMO, and EIG 2 was the second. Both, however, only explained about one fifth of the variance in the #HELPMO scores. DENSITY 1 which was significantly correlated with both #HELPERS and #HELPMO, was not included as a significant predictor of either variable. Apparently, DENSITY 1 is so closely related to DENSITY 2 that it had little independent association with the variables.

%HELPERS-R. The two significant predictors of %HELPERS-R were both characteristics of the intimate network: EIG 4

and DENSITY 2. Although both EIG 1 and EIG 2 had higher zero-corder correlations with %HELPERS-R than did DENSITY 2, they added little significant increase in the variance after EIG 4 was entered. The amount of variance explained by predictors EIG 4 and DENSITY 2 was quite high, .40.

%HELPERS-F. The most significant predictor of the %HELPERS-F was the size of the intimate network. Other significant predictors included the composition of the extended net (EIG 1) and the composition of the intimate net (EIG 5). All three network properties explained .29 of the total variance in this measure.

%HELPERS-O. The step-wise multiple regression revealed three statistically significant predictors of %HELPERS-O: SIZE 2, DENSITY 1 and EIG 4.

Discussion. The importance of SIZE as a predictor of the source of help received (%HELPERS-F, and %HELPERS-O) suggested that perhaps instead of using composition measures as proportions a more useful measure as a predictor might well be the sheer number of people who were relatives, friends, and others.

It is also worth noting that for the most part, it is some property of the intimate network which is the best predictor of the dependent variable. The size of the extended net, for example, was never a significant predictor. The density of the extended net was of importance only in the prediction of the %HELPERS-O.

The step-wise multiple regression analysis revealed

which network variables were the best predictors for which helping variables. It suggested that different combinations of network characteristics are significant predictor sets for different helping variables. Practically speaking, this raises a question concerning the usefulness of an all encompassing description of network properties taken simul - taneously (as they were in the clustering procedures) or an all encompassing description of the relationship between the two sets of variables taken simultaneously (as they were in canonical correlation analysis and multivariate analysis of variance).

In some sense then, it appears that one might make a distinction between an accurate description of reality and a useful model which explains human behavior. It may be that an accurate description of social networks as they actually exist in a certain population is not the most useful device for explaining a certain kind of behavior. In an applied context, it may be more useful to talk about those features of the social network which are significantly related to the behavior under analysis (in this case specific helping variables), and ignore the multiplicity of network characteristics which only tend to add ambiguity to the findings. Rather than searching for one all encompassing solution to the question of the relationship between social networks and help obtained in self-planned learning, it appears to be more feasible to talk about a multiplicity of solutions, specifying certain network

properties and certain helping variables under certain conditions.

CHAPTER V

SUMMARY AND CONCLUSIONS

The present investigation attempted to describe the relationship between the structural characteristics of an individual's personal social network (its size, density, and composition) and the amount, source, and type of assistance received by adults conducting intentional self-planned learning projects. More specific research objectives were to:

1. assess the degree of association between selected structural characteristics of an individual's social network and the amount, source, and type of assistance received during self-planned learning;
2. identify type of personal social networks by clustering a sample of self-learners who had social networks with similar configurations of network properties;
3. examine the data for indications as to whether the resulting clusters of subjects differed in the amount, source, and type of assistance they received during self-planned learning; and
4. assess the relative importance of the network characteristics in predicting the amount, source, and type of help received in self-planned learning.

Following a review of the relevant literature, ten network properties and six variables related to the amount, source, and type of help received, were specified. An instrument was developed to measure these variables. A sample of young non-college bound adults was randomly drawn from a list of 661 names of individuals who had dropped out of high school or who had not had their high school transcripts sent to any other educational institutions. In-depth interviews were conducted with fifty self-learners in the sample. There were three main phases in the analysis of the data:

1. a description of the variation in the extent of self-planned learning for fifty young non-college bound adults;
2. a description of the social networks of this sample of self-learners; and
3. an analysis of the relationship between network properties and the amount, source, and type of help received in self-planned learning.

Summary of Findings

Extent of Self-Planned Learning

1. The extent of self-planned learning in this sample of young non-college bound adults was quite similar to the extent of self-planned learning reported in other samples. Of 64 individuals interviewed, 77 percent (or 50) indicated that they had undertaken some form of self-planned learning during the previous six months. The fifty subjects conducted

114 separate learning projects, an average of 2.28 per subject, with some subjects undertaking as many as five.

2. The fifty self-learners obtained a large amount of assistance during their intentional efforts to learn. They reported that 514 people provided help for their 114 projects - - an average of 10.3 helpers per person, with a range of from 1 to 25 helpers.

3. Friends provided the self-learners the most help (43.2 percent of the total helping transactions) and relatives the least (20.4 percent).

4. A majority of the helpers (63.8 percent) provided the learners with sustained help, giving information or assistance three or more times.

Social Networks

5. The extended networks of the sample of fifty self-learners consisted of a total of 1409 people, an average of 28 people for each subject, with a range of from 7 to 57 network members. The extended network, on the average, consisted of approximately 43 percent friends, 29 percent relatives, and 28 percent others. The density of the extended network, on the average, was 46.03 percent.

6. The intimate networks of the self-learners, consisted of a total of 1047 people, an average of 21 people per subject, with a range of from 3 to 55 people. The density of the intimate network was, on the average, 52.7 percent - - higher than the extended network. The intimate network was composed of 61 percent friends,

25 percent relatives, and 14 percent others.

7. The structural characteristics of the personal social networks of the self-learners showed considerable variation. Cluster analysis yielded three clusters of network properties. The networks in cluster 1 were larger in size, less dense, and higher in the proportion of friends. Cluster 2 networks were moderately large in size, and had a greater proportion of others. Cluster 3 networks were more dense with a higher proportion of friends and relatives than the other two clusters. They also tended to be smaller in size.

Social Networks and Self-Planned Learning

8. Certain structural characteristics of the personal social network were significantly related to the amount, source, and type of help received by the self-learners in the sample. Regarding the characteristics of the extended network

a. SIZE 1 was associated only with the proportion of the helpers who were friends.

b. DENSITY 1 was associated with both the total number of helpers and the number of helpers who provided sustained assistance, three times or more.

c. COMPOSITION measures were associated with the total number of helpers, the number of helpers who provided asssitance once or twice, the proportion of helpers who were relatives, and the proportion of the helpers who were friends.

Regarding the characteristics of the intimate network

d. SIZE 2 was associated with the proportion of the helpers who were friends and the proportion of the helpers who were others.

e. DENSITY 2 was associated with both the total number of helpers and the number of helpers who provided sustained help, three times of more.

f. COMPOSITION measures were associated with the number of helpers who provided sustained help, the proportion of the helpers who were relatives, and the proportion of the helpers who were others.

In general, the structural characteristics of the intimate network were more highly associated with measures delineating the amount, source, and type of help received than were the structural properties of the extended network.

9. There was a significant association (canonical correlation of .68, $p < .01$) between the set of structural characteristics of the social networks (intimate and extended) and the set of six measures delineating the amount, source, and type of help received.

10. The differences in the mean scores on the six dependent variables measuring amount, source, and type of help received for subjects grouped into three types of social networks, as identified by the cluster analysis, were not significant when tested by a multivariate analysis of variance.

11. Step-wise multiple regression analysis yielded the finding that different combinations of network

characteristics were significant predictor sets for each of the six dependent variables. The six significant predictor sets are listed below. Concerning the amount of help received

a. The best predictors of the number of helpers were a measure of the composition of the extended network and the density of the intimate network.

Concerning the type of help received

b. The best predictors of the number of helpers who provided help only once or twice were a composition measure of the extended network and a composition measure of the intimate network.

c. The best predictors of the number of helpers who provided sustained help, three times or more, were the density of the intimate network and a composition measure of the extended network.

Concerning the source of help received

d. The best predictors of the proportion of the helpers who were relatives were a composition measure of the intimate network and the density of the intimate network.

e. The best predictors of the proportion of the helpers who were friends were the size of the intimate network, a composition measure of the extended network, and a composition measure of the intimate network.

f. The best predictors of the proportion of the helpers who were others were the size of the intimate network, the density of the extended network, and a composition measure of the intimate network.

Better predictions were possible for the variables measuring the source of help than for the variables within the categories amount and type of help.

Conclusions

The following conclusions have emerged from an assessment of the findings reported in the present investigation.

1. Intentional self-planned learning behavior is a significant and widespread phenomenon which may be found even among young adults who, for the most part, have deliberately removed themselves from learning conducted in educational institutions.

2. For the sample of young adults in the present investigation, information and assistance for self-planned learning efforts was obtained from what may be termed their personal social network.

3. It is feasible to measure various structural characteristics of personal social networks, to assess them simultaneously, and to identify an empirical typology of networks.

4. Variation in the amount, source, and type of help received by self-learners was associated with differences in the size, density, and composition of their

personal social networks.

5. Three network types, established from data on ten structural characteristics measuring size, density, and composition for 50 networks, were not useful in describing variation in the amount, source, and type of help received by self-learners. A more detailed typology of networks, established from a larger sample is needed to describe variations in resource acquisition. However, it appears unlikely that a single set of structural characteristics can be identified which will be associated with variations in dimensions as diverse as the amount, source, and type of help received during a self-planned learning effort.

Implications for Further Research

Self-Planned Learning

The following recommendations are the implications of the present study for researchers interested in the study of self-planned learning.

1. The present investigation reported wide variation in the extent of the intentional learning efforts of young non-college bound adults. It is possible that variations in the extent of learning, learning style, learning strategies, and effectiveness in obtaining resources cut across the frequently used socio-economic categories, (such as age, education, occupation) which are often the focus of sampling in studies of this type. Future research might well be directed toward identifying the varieties of similar self-learners who appear

throughout the social strata in various stages of their life cycle.

The method of cluster analysis appears to be a viable tool which could well be applied to the problem of establishing categories of self-learners once the relevant dimensions of this construct are determined.

Cluster analysis is a more precise statistical method for grouping individuals than more frequently used arbitrary and qualitative criteria (such as dichotomizing or trichotomizing the sample on the mean or median) particularly when the basis for grouping involves more than two variables. Even with only two variables, cluster analysis provides a more satisfactory solution as may be seen in Appendix IV.

It is important to note, however, the limitations of a small random sample when clustering techniques are used. Random selection may be important for inferences about a population, but for clustering and the identification of the underlying structure of a population on a set of specified variables, selective sampling may be more appropriate given constraints on sample size. It is quite possible that a distinct cluster (representing some important dimension) may be under-represented in a small random sample and that this cluster which is represented by only one or two subjects would be submerged and lost within a larger cluster.

2. Research has established that intentional learning efforts outside of educational institutions and programs are not uncommon. The findings of the present investigation do not speak directly to the appeal or efficacy of self-planned learning. These are areas which should be pursued in future research. Why do adults undertake self-planned learning? What are the qualities of self-planned learning which make it more appealing than attending institutionalized educational programs? What are the advantages and disadvantages of both types of learning behavior? What is the quality of learning undertaken in self-planned learning projects? How can it be assessed?

3. Further research is needed on the reasons why help is sought and obtained by self-learners. As noted in Chapter III of the present investigation, subjects had difficulty responding to the set of questions which delineated 12 teaching tasks, thought to be encountered by self-learners (Tough, 1967). It is possible that either self-learners do not, for purposes of learning, view the need for resources in terms of such an itemized list of tasks, or that the list of teaching tasks was not structured and phrased in terms perceived by the learners. Further research on the self-learner's perception of resources and problems for which resources are needed might be profitably directed toward some of the following questions. What characteristics of resources are on the self-learner's

mind when he chooses them; does the learner want expertise, compatibility, a simple reference, comprehensive knowledge and plans, or some combination of characteristics. Do learners choose the type of resource before selecting a particular resource? Do some learners immediately consider using non-human resources, while other tend to turn to other people for help. If so, why? When human resources are selected, does the learner select a resource because he is an expert, a teacher, a friend, or does he have a particular individual in mind? What is the relationship between the type of problem or type of project and the resources selected? Are certain goals or are some resources used only for specific types of problems and goals.

4. In terms of actual behavior, type of help in the present investigation was measured by the number of helpers who provided help once or twice (#HELPO) and the number of helpers who provided more sustained help, three or more times (#HELPMO). Data on these two dimensions of type of help could be collected in more detail. It appears likely that at least four different types of help might be distinguished:

a. People who helped only once or twice and in a very specific and limited way (i.e. supplying information about equipment).

b. People who helped more than once or twice, but only for one specific type of problem, such as helping with difficulties in subject matter,

or only providing encouragement.

c. People who helped three or more times in a variety of ways (helping the subject get equipment, providing encouragement, and assisting in the evaluation of the learning as it proceeded).

d. Finally, people considered by the learner as "significant" helpers - - people without whose help the project would have failed or people who helped the learner frequently in a variety of ways.

5. The present investigation has assumed that help, sought and received, involves a transaction between helper and learner. It might be fruitful to examine the extent to which helping relationships are reciprocal. Is it true, for example, that learners who receive a lot of help also provide help for others - - what is the payoff? Is help received and given among the same people, or does a learner obtain help from one source, and provide help for a different person or group of people?

Social Networks

The following recommendations are the implications of the present study for researchers interested in the study of social networks.

1. There needs to be further specification of the structural characteristics of social networks which are important to the accurate description of networks. There also needs to be further specification of which structural characteristics are significantly related to specific

types of behavior. These two tasks may not overlap and indeed may form two separate problems which should not be merged as they are in the present investigation. It may be more productive to avoid using the entire complexity of two sets of variables (such as the structural characteristics of social networks and dimensions of help received in self-planned learning), which comprises what appears to be an accurate description of the two phenomena, and focus only on those components of the two complex sets of variables which are highly associated. For practical purposes, a complete and accurate description of the social network may be less useful than the specification of one characteristic (such as density) which more than all the others, explains another phenomenon (such as congugal roles in Bott's study). Although the individual in the real world is a part of the complexity of the combinations of variables, for a researcher solving one practical problem, reduction in the total number of variables is not only sufficient, but necessary.

2. Concerning the accurate description of social networks, cluster analysis appears to be a useful tool for empirically establishing types of networks, once the relevant structural dimensions have been identified. Further research, with different populations and larger samples, needs to be conducted so that some empirical standards can be identified for a typology of networks on a selected set of structural properties.

3. In the present investigation, several problems in the conceptualization of the social network and the measurement of its structural characteristics were encountered which require the attention of other researchers.

a. For the purposes of research, any individual may be said to have many different personal social networks, depending upon the definition and limitation of the social network set by the investigator. In the present study, an extended and an intimate network were identified for each subject. It appeared that while the properties of these two networks were highly correlated, single pairs of measures acted quite differently in their ability to predict a certain behavior (i.e. the density of the intimate network was associated with and predicted the number of helpers who were freinds, while the density of the extended network was not so associated, nor was this measure a good predictor). A large loosely-knit extended network was often found in combination with a large loosely knit intimate network, but not always. A distinctive feature of some networks in the present study, was the wide divergence between the properties of the extended and intimate networks. A compairson between the variety of personal social networks which a researcher could examine might well reveal differences which were associated with the variations in behavior and

which have import for the problem under analysis.

b. One deficiency in the measure of density, as it was used in the present study, is that it does not distinguish between networks with several isolated cliques and loosely knit networks with no cliques. Density scores for these two different types of networks may be identical. An additional measure needs to be developed which will allow for this distinction.

c. The study of self-planned learning revealed that certain members of an individual's social network are recruited and become a part of the network on the basis of shared interests. Other members of the network, such as people in the home or relatives, may be said to be assigned to individuals. This consideration leads to a question which needs more study: to what extent are networks constructed by the members and to what extent are networks given to them. Assessing the energy or activity with which people accept or reject members of their personal social networks may provide a key to the way in which networks are used.

Practical Implications for Adult Educators

The following considerations consist of the major implications of the present study for practitioners in adult education who may be interested in assisting adults in their intentional efforts to learn, or in using

knowledge about self-planned learning in designing educational programs.

The implications of findings about self-planned learning behavior for practitioners, depend to a large extent upon the goals of the practitioner and his institution. The difference between institution goals and the goals of the self-learner should be carefully assessed before adding opportunities for self-learning to the curriculum, individualizing instruction, de-emphasizing credit, or adopting the trial and error method of knowledge acquisition. These practices, which may bear some resemblance to the way in which self-planned learning proceeds, may run contrary to some of the explicit goals of an educational institution (i.e. the efficient transmission of knowledge in return for certification) and the expectations of some students. It is quite possible that having both institutionalized education and self-planned learning go on simultaneously, without impinging upon each other, is a healthy state of affairs.

Facilitating self-planned learning without destroying its essential feature - - the autonomy of the learner - - is a difficult problem. Emphasis could be placed throughout the educational system in developing those skills which make self-planned learning more enjoyable, particularly the acess to resources. In general, however, it would appear more feasible for practitioners to acknowledge the fact that learning does go on outside of institutions

and use research on self-palnned learning for the advancement of their own goals and programs. Several suggestions are listed below.

1. The Allen Tough Questionnaire, or something like it, could be potentially useful as an effective planning tool for analyzing the learning goals of adults. Adult educators could gain considerable insight into client needs and learning styles by interviewing representative adults of a target audience as to their learning activities during the past year. One problem which might be encountered, illustrated in the present study, is that the topics pursued in self-planned projects often fall outside the traditional offerings of adult educational programs. Further, disadvantage of this instrument is also its strength: in order to obtain useful information, the interview takes a tremendous amount of time.

2. In terms of marketing adult education to underserved adults (such as non-college bound young adults), information dissemination and outreach might be most effective through peer group networks, if they can be identified, which often include the quasi-experts who are frequently asked for help (such as photographers, electronics repairmen, electricians, carpenters).

3. Some of the subjects in the present study indicated that they intended to return to educational institutions for credit. If true, it is possible that admissions officers may often be unaware that a particular applicant

has conducted what may be extensive self-planned learning projects. Such projects would certainly not appear on the transcripts of applicants. Questions about self-planned learning might be a useful addition, because many applicants who may appear on paper to be bad educational risks (having dropped out of high school or just barely graduating) may not be learning novices. In the same vein, several studies have indicated that the success of adults returning to school is associated with the extent to which they have participated in adult education previously. In the past, participation has been measured by activity in educational programs. The definition of "participation" might well be extended to include learning activities conducted on one's own.

4. Since some adults may find group learning in the classroom less stimulating than their own intentional learning efforts, teachers of adults may need to incorporate more flexibility in the learning structure of their programs. This does not mean that every course need necessarily be turned over to the students for their own self-planned learning projects, but it does suggest that adult educators might provide students more opportunities to earn degree credit outside of the classroom, perhaps through some tutorial program.

5. Insofar as counseling is concerned, the in-depth interview used to gather information about self-planned learning projects results in a heightened awareness about

learning for both the interviewer and the interviewee. Through the interviewing process self-learners can become aware of the progress they had made over time, and the obstacles which prevented them from achieving their goals. The interview itself provides an avenue through which an adult educator could act as a facilitator in identifying problem areas, suggesting resources, and perhaps even introducing learners with similar interests to each other. In order to be an effective counselor, however, the adult educator must have some experience in analyzing his own self-planned learning efforts. In this sense, then, the interview might act as a self-assessment device for adult educators.

The present investigation was guided by an underlying thesis that the structural features of an adult's immediate social environment set the conditions and context for the amount, source, and type of help obtained during intentional self-planned learning efforts. Network analysis was used to explore this thesis. The research provided data which suggested that self-planned learning for a sample of non-college bound young adults was extensive and that they obtained help for their self-planned learning projects from members of their personal social network. The concept of social network under consideration was limited to measures of ten structural characteristics. Differences

among three distinct types of social networks, identified through a multivariate clustering technique, were described. Significant associations between single network properties and single measures of help were identified as well as a significant relationship between the two sets of variables. Finally, several combinations of network variables were identified as significant predictors for each of the six measures of help obtained. The use of a network approach in the study of the resources obtained in self-planned learning appears to be appropriate and justified.

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APPENDICES

APPENDIX I

INTERVIEW SCHEDULE*

My research is about how people learn on their own. Our interview can be about anything at all that you have learned during the past six months. Only one kind of learning cannot be included: namely, things you learned by attending a course or by paying for private lessons.

The learning that we discuss in this interview can involve any sort of information or knowledge or skills at all. It does not matter whether the things you wanted to learn were difficult or not, or whether they were especially important, or whether they were the sorts of things usually taught in schools and colleges or not. Some of these things may have interested you for a long time, while other things may be only a recent interest.

The only requirement is that, during the past six months, you spent at least eight hours at this particular learning.

On the next sheet is a list of some of the things people learn. It may remind you of some of the things that you have tried to learn during the past six months. Please try to think of one or two learning projects which seemed the most important to you since last August.

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*The author gratefully acknowledges the assistance of Allen Tough for making much of the material on learning projects available.

Some things that people learn about*

1. a sport or game; swimming; dancing; bridge
2. current events; public affairs; politics; biography
3. sewing; cooking; homemaking; entertaining
4. driving a car
5. home repairs; woodworking; home improvement project; decorating and furniture
6. a hobby or craft; collecting something; photography
7. raising a child; infant care
8. nature; agriculture; birds
9. mathematics; statistics; arithmetic
10. speed reading; effective writing; public speaking; vocabulary; literature
11. science; astronomy; man in space
12. health; physical fitness
13. history; geography; travel; some region or city
14. personal finances; saving; insurance; investing buying something
15. psychology; leadership; social skills
16. typing; data processing; mechanical skill
17. gardening; landscaping
18. something related to a job or responsibility
19. musical instrument; singing; music appreciation
20. sales skills, how to teach or supervise
21. some aspect of religion; ethics; philosophy, moral behavior
22. current changes in cosiety; the future; energy crises

23. relationships within the family
24. art; painting; architecture
25. business management; economics business
26. a new way of doing something; inventions; an innovation
27. English; French; some other language

*Sheet handed to subject

(ask the following questions for each self-planned project which tentatively meets the criteria)

I am going to ask five or six general questions about the learning project which you have selected, in order to gain an understanding of the entire project.

1. What was the goal of this project? (brief, general statement of what knowledge and skills the subject wanted to learn).

2. What was the reason or purpose for selecting and pursuing this goal?

3. What were the specific areas of knowledge and skill that were learned?

4. What did you do to achieve your goals? (in general, were things read, people contacted for help, did observation play a part, practice, etc.)

5. When did you begin this project?

6. What is the project's current status:

(1) ongoing

_____ (2) ended

(3) temporarily laid aside

7. How many hours did you spend on this project during the month of _____?

0-5	5-10	10-25	25-50	50-100	over 100
1	2	3	4	5	6

I would like to return to this project later and ask some other questions about it. Right now, though, I would like to ask a few general questions about yourself and who you know.

SOCIAL HISTORY

Card 1

Column

_____ Card #
1

_____ Subject #
2-3

_____ Age
4-5

_____ Where were you born?
6
(1) Durham-Chapel Hill area
(2) North Carolina
(3) Outside North Carolina

_____ How long have you lived in this area (years)?
7-8

_____ How many times have you moved in the past 10 years?
9

_____ Are you married?
10
(0) No (Skip to 13)
(1) Yes

_____ Do you have children?
11
(0) No (Skip to 13)
(1) Yes

_____ How many?
12

_____ 13 Where do you live:
(1) at home with parents
(2) alone
(3) with wife
(4) with friends

_____ 14 Do you have a job at the present time?
(0) No (Skip to 16)
(1) Yes

_____ 15 What kind of work do you do?
(1) Manager or proprietor
(2) Farmer (of at least 100 acres)
(3) Clerical, sales, technician
(4) Skilled craftsman
(5) Operative, semi-skilled worker
(6) Service worker
(7) Unskilled
(8) Farm labor
(skip to #17)

_____ 16 Are you looking for work?

SOCIAL NETWORKS

_____ 17 How many people live with you in your household?
(map, names)

_____ 18-19 Do you have any other close blood relatives (parents, brothers, sisters, uncles, aunts, nieces, nephews or first cousins) who are important to you or who you see at least once a month.

_____ 20-21 Altogether, about how many times a month do you visit, write, or telephone them (everyday, 4-6 times a week, 2-3 times a week, 1 time a week, once every two weeks, once a month. Show subject chart of frequency, write amount of contact on map for each person).

_____ 22 Do you have any close friends (other than relatives) who you see at least once a month (map, names).

_____ 23-24 Altogether, how often do you visit with, write or telephone them.

_____ 25 How many of your neighbors (other than close friends or relatives) do you know well enough to visit in their homes? (map, names)

_____ 26-27 Altogether, how often do you visit with or telephone them? (map, names)

_____ 28 How many of your fellow workers do you work with closely each day (interact with several times a day)? (map, mames)

_____ 29 How many times a month do you attend religious services?

_____ 30 How many times a month do you attend meetings of other groups such as clubs, unions, associations, or organizations?

_____ 31 With whom do you spend most of your free time?

(1) by myself
(2) with my wife/children
(3) with parents
(4) with relatives
(5) with friends

_____ 32 Have you participated in any of the following adult education activities in the last six months?

(1) evening classes
(2) lectures
(3) group discussions
(4) on-the-job training
_____ 33 (5) private instruction
(6) correspondence courses
(7) TV courses

34. Of all the people outside your home, which ones do you feel closest to: these could be friends, neighbors, or relatives (note on map, names)

35. If employed: how did you find your present job? (map, names)

If not employed: what ways are you using to find a job? (map, names)

36. Who are the people you see most often socially? (map, names)

37. Who on this map <u>knows</u> who? (map, links)

38. Who on the map <u>sees each other socially</u>? (map links denoting voluntary network).

Now I would like to use this map of the people you know, and talk about the learning projects you mentioned earlier.

During your efforts to learn, you may have had some sort of contact with a variety of individuals.

Some of these people may have helped you in some way, perhaps by giving advice or suggestions, or by cheering you up or increasing your motivation. Other people may merely have expressed some interest in your efforts to learn, or may have discussed them with you. Still other people may have recommended or provided some books or equipment for you.

Please list (by initials, or by a description if you do not know their name) each individual who had some contact or connection with your learning.

It is important to list <u>every</u> person who had any sort of contact with your efforts to learn. You cannot jot down too many individuals, because we will later eliminate the unnecessary ones.

Perhaps some of the following kinds of people had some sort of contact with your efforts to learn. Perhaps such a person expressed some interest or encouragement, for example, or perhaps gave some advice or information or suggestions, or played some other part in your learning. (After respondent has attempted to list as many people as possible, hand out the following sheet to stimulate recall.)

FREQUENCY OF CONTACT (VISIT, WRITE, OR TELEPHONE)

times per month	30	20	10	4	2	1
	everyday	4 to 6 times a week	2 to 3 times a week	once a week	once every 2 weeks	once a month

(chart shown to subjects to assist in recall of frequency of contact per month)

*sheet handed to subject

People who may have had contact with your project and may have provided information or assistance.

- - your brother or sister
- - your wife
- - your child
- - some other relative
- - a friend
- - a neighbor
- - someone who works with you
- - a librarian
- - a bookstore clerk or other sales person
- - a teacher
- - a professional expert

III. Teaching Tasks.

Now I would like to shift your attention to some of the tasks (such as making certain decisions and dealing with certain problems that adults might perform while trying to teach themselves. The description of these tasks is written on these sheets. I would like to show them to you and ask you if you had to deal with this problem or decision for your own learning project. Secondly, I would like you to look at your list of people who had some contact with your project and tell me if any of them gave you information or help in dealing with the task. Here is the first task.

(Interviewer will place the description of each task in front of the subject. The task will be more completely explained if the subject does not understand. The interviewer will ask if the subject had to deal with this particular problem or decision. If the answer is affirmative, the interviewer will ask if any one gave information or assistance in dealing with the task.)

(All responses will be recorded on a sheet for each task. Any qualitative information as to the type of help or information given, or how it was asked for or received, will also be recorded.)

(The sequence of questions will be repeated for all 12 tasks.)

1. Deciding where to learn;
2. Deciding how much money to spend;
3. Deciding when to learn or for how long;
4. Choosing the goal: deciding what knowledge or skill to learn;
5. Deciding the specific activities, methods, resources or equipment needed to achieve the goal;
6. Setting specific deadlines, intermediate targets or goals - - setting the pace for learning;
7. Estimating the current level of knowledge or skill, and progress toward the goal;
8. Obtaining printed materials, equipment or other resources;
9. Dealing with a lack of desire for achieving the goal;
10. Dealing with doubts about success;
11. Dealing with difficulty in grasping parts of the subject matter;
12. Deciding whether to continue learning.

CHART OF HELPING ACTS

(Information and Assistance)

	People in Household	Close Relatives	Close Friends	Experts	Others (Sales People, co-workers acquaintances)	Total
1. Where to learn						
2. How much money						
3. When to learn - how long						
4. Obtaining material equipment						
5. Choosing goal - what to learn						
6. Specific activities methods, equipment						
7. Setting date deadlines						
8. Estimating level of knowledge						
9. Dealing with lack of desire						
10. Dealing with doubts of success						
11. Dealing with difficulties						
12. Deciding whether to continue						

Teaching Tasks

1. Deciding where to learn.
2. Deciding how much money to spend.
3. Deciding when to learn or for how long.
4. Choosing the goal: deciding what knowledge or skill to learn.
5. Deciding the specific activities, methods, resources or equipment needed to achieve the goal.
6. Setting specific deadlines, intermediate targets or goals - - setting the pace for learning.
7. Estimating the current level of knowledge of skill, or progress toward the goal.
8. Obtaining printed materials, equipment or other resources.
9. Dealing with a lack of desire for achieving the goal.
10. Dealing with doubts about success.
11. Dealing with difficulty in grasping parts of the subject.
12. Deciding whether to continue learning.

IV. Additional information about the teaching tasks.

1. We have now finished dealing with several of the important tasks that you performed. In addition to the tasks on the sheets, perhaps you remember performing some other tasks, or making some other decisions, or dealing with certain problems and emotions. I would be interested in hearing about some of these things and any individuals who may have helped.

APPENDIX II

PROJECT TYPE AND HELP RECEIVED IN SELF-PLANNED LEARNING

Problem

Chapter III reported that the learning projects of the sample of non-college bound young adults were defined as being major, minor, or work projects. The classification of project type emerged from the data as a logical and apparently important dimension which appeared to effect and influence the amount, source and type of resources used by the subjects in their self-planned learning. A tentative analysis of the impact of project type is reported in this appendix.

Method

Data analyzed were obtained from fifty self-learners (as described in Chapter III).

An additional dichotomy which seemed related to project type was whether the helpers were actively sought by the learner (SOUGHT) or whether the access to the helper was primarily controlled by the helper himself (GIVEN). This dimension SOUGHT - - GIVEN, was included for the purposes of analysis in this portion of the study alone. The following considerations and procedures were employed in analyzing the impact of project type.

First, this study was not designed to utilize the most powerful statistical technique for analyzing the

difference between project types on the helping variables: multivariate analysis of variance. Ideally, multivariate analysis of variance is a means by which one could study the differences among groups (categorized by project type) in terms of many dependent variables (in this case, the helping variables) considered simultaneously. Usually multivariate analysis is concerned with a group (or several groups) of individuals, each of whom possesses values or scores on two or more variables. We are interested in studying the interrelations among these variables, in looking for possible group differences in terms of these variables, and in drawing inferences relevant to these variables concerning the populations from which the sample were chosen. Unfortunately, the data available categorized not <u>individuals</u> into groups, but <u>projects</u>: the fifty randomly selected subjects conducted 114 separate self-planned projects. It was, in fact, the 114 projects which had been categorized into the three types. Since one of the assumptions of analysis of variance is that the observations are independent, and in this study the data were a result of repeated measurement (some subjects provided data on the helping variables for more than one project, and for more than one project type) other methods of analysis were necessary.

One alternative to the problem of correlated measures is the one factor (type of project) repeated measures design. The following description of this design and

analysis is taken from Ferguson (1971):

> The data resulting from such experiments may be represented as a table of numbers in which rows represent experimental subjects and columns represent treatments, that is, the presentation of the data is the same as that for the two way classification with one observation per cell. Three sums of squares results: sums of squares for subjects (rows), treatments (columns and interaction) (p. 241).

The table for this study would have been a 3 (project type) by 50 (number of subjects) matrix with 150 cells. Given the fact that there were only 114 observations (projects), and in addition that some subjects had conducted more than one of their projects within a specific type (resulting in several observations for one subject in one cell) it was decided that there were too many missing cells in this design and that the analysis would not be appropriate.

Another alternative considered was the use of a paired t-test (or correlated t-test) for those subjects who undertook two types of projects. This alternative was rejected, because of the small number of subjects, undertaking two type of projects, who could be compared.

Finally, as a best approximation of the significance of the differences between the means scores on the helping

variables for the three different types of projects, the following analysis and presentation was adopted. First, the means for all 114 projects, categorized by the three project types are reported. As noted, significance tests on the differences between means were not appropriate.

Then, fifty self-planned projects were randomly selected from the total of 114 projects: one project for each subject. The results of this random selection of projects was 50 independent observations for 50 subjects on each of the helping variables.

Mean scores on the helping variables for the 50 randomly selected projects were qualitatively compared to the total mean scores for all 114 projects.

Finally, the fifty self-planned projects, one for each subject, were then used as the basis for a multivariate analysis of variance on the helping variable. Before running the MANOVA analysis, hower, it was necessary to construct two separate groups of helping variables. The entire set of helping variables used in this analysis was composed of ipsative measures (the proportion of the helpers who were relatives, friends, and others = 1) and measures which were linear combinations (#HELPERS= #SOUGHT + #GIVEN; #HELPERS =HELPO + #HELPMO). These two types of measures seriously affect the results of the multivariate analysis of variance. In the case of ipsative measures (a set of variables such that the total score is the same for every individual) the SSCP matrix, upon which

the MANOVA is performed, becomes singular and the analysis is terminated. Consequently, the helping variables were divided into two sets, each of which contained no ipsative measures and no variables which were linearly dependent:

Set 1: #HELPERS, #SOUGHT, #HELPMO, %HELPERS-R, %HELPERS-F

Set 2: #HELPERS, #GIVEN, #HELPO, %HELPERS-F, %HELPERS-O.

In addition, special contrasts between Major-Minor projects, and Major-Work projects were specified. The A priori hypotheses being tested were that the major projects would have a greater #HELPERS, #HELPMO, #SOUGHT, and %HELPERS-O than the minor projects; and that the major projects would have less #GIVEN but more %HELPERS-F and %HELPERS-O than the work project.

Significance tests are reported as the best estimate of the significant difference for the entire 114 projects.

A final analysis was performed to determine whether the effects of the clusters (the network groups) and the type of projects interacted on the helping variables.

As noted, the data did not allow for the obvious two way MANOVA analysis which is the appropriate statistical technique to use in answering this question. Further extension of the analysis used above (randomly selecting fifty projects as an approximation of the findings for the entire sample) was also not possible because of an inadequate number of subjects in each cell, and some missing

cells in the two way design. Consequently, as the best approximation of the interaction effect between these two dimensions, cell means for each helping variable, in a two way table (three project types and three clusters) were plotted. Figures show the three project types along the baseline and plots of the mean scores (for specific helping variables) of the three network clusters.

Results

Table II.1 shows the distribution and differences for the three project types (for all 114 projects) for the total number of helpers, the number of helpers who were sought by the learner and the number of helpers who were given, the number of helpers who provided assistance only once or twice, and the number of helpers who provided more sustained help.

In general, over all of the helping variables, the type of project did appear to be related to the quantity and quality of the help received:

1. Subjects received less help for the minor projects: #HELPERS, by people who helped once or twice (#HELPMO). and by people who provided sustained help (#HELPMO).
2. The number of helpers actually <u>sought</u> by the learner was greater for the major projects.
3. The number of helpers <u>given</u> (help received without an active search) to the subject was greater for

TABLE II.1

Frequency of Helping Transactions for Three types of Projects

			#HELPERS	#SOUGHT	#GIVEN	#HELPO	#HELPMO
Type of Project	1. Minor Transactions		103	80	23	39	64
	(N=46)	M	2.24	1.74	.50	.85	1.39
		SD	1.30	1.29	.78	1.07	.954
	2. Major Transactions		272	247	25	101	171
	(N=44)	M	6.18	5.61	.57	2.30	3.89
		SD	3.47	3.67	1.04	2.76	2.71
	3. Work Transactions		139	56	83	47	92
	(N=24)	M	5.83	2.3	3.6	1.96	3.83
		SD	4.22	2.96	2.83	2.14	2.84
	Total Transactions		514	383	131	187	327
	(N=114)	M	4.52	3.36	1.16	1.64	2.868
		SD	3.53	3.29	1.94	2.17	2.508

the work projects.

Table II.2 shows the relative importance of the different type of helpers for the three project types.

The major difference in the types of helpers for the three project types appears to lie in the categories %HELPERS-F and %HELPERS-O for the minor and work projects. Overall, the major projects conform almost exactly to the pattern of help for the projects taken as a whole. Further, there appeared to be little variation in the %HELPERS-R used for the three types of projects (approximately 20 percent of the help was provided by relatives). However, the minor projects were associated with a greater proportion of help coming from friends and a lesser proportion of help coming from others. The work projects were the mirror image of the minor projects: a greater proportion coming from others (than the average) and a lesser proportion of help from friends.

Table II.3 presents the means and standard deviations for the fifty randomly selected projects on the first set of helping variables (#GIVEN, #HELPERS, #HELPO, %HELPERS-F, %HELPERS-O).

A comparison of these means and standard deviations with the total 114 projects, shows that the means are almost identical (although the variance in the randomly selected projects appears to be less). The means for each

TABLE II.2

Source of Help for the Three Project Types

		Source			
		Relatives	Friends	Others	Total
Type of Project	1. Minor Transactions (N=46)	23	59	21	103
	% of help in project type	22.3%	57.3%	20.4%	
	2. Major Transactions (N-44)	53	123	96	272
	% of help in project type	19.5%	45.2%	35.3%	
	3. Work Transactions (N=24)	29	40	70	139
	% of help in project type	20.9%	28.8%	50.#%	
	Total Transactions	105	222	187	514
	% of Total	20.4%	43.2%	36.4%	

TABLE II.3

Means and Standard Deviations for 50 Randomly Selected Projects on First Set of Helping Variables

Project Type		#GIVEN	#HELPERS	#HELPO	%HELPERS-F	%HELPERS-O
1. Minor Projects (N=20)	M	.30	2.05	.65	47.75	17.25
	SD	.47	1.15	.93	46.69	32.50
2. Major Projects (N=20)	M	.35	6.95	2.45	48.71	33.88
	SD	.81	3.80	3.02	27.84	29.57
3. Work Projects (N=10)	M	4.90	7.00	2.00	18.52	60.69
	SD	2.81	5.16	2.16	18.75	24.36
Total (N=50)	M	1.24	5.00	1.64	42.29	32.59
	SD	1.37	3.39	2.22	35.29	29.91

TABLE II.4

MANOVA: First Set of Helping Variables
Multivariate Tests of Significance Using Wilk's Lambda Criterion

N=50

General Analysis	F (10,86) = 13.05	p .001

Univariate F Tests Variable	F (2,47)	p
#GIVEN	44.901	.001
#HELPERS	12.627	.001
#HELPO	3.453	.040
%HELPERS-F	2.801	.071
%HELPERS-O	7.065	.002

of the variables in the set within the project types show greater variance from the means for the 114 projects, nevertheless, the basic relationships remain about the same. Only the differences on variable #GIVEN appears to be greatly exaggerated or surpressed. Over 114 projects, work projects use approximately 7 times more #GIVEN helpers than the minor projects; in the fifty randomly selected projects, work projects use approximately 16 times more #GIVEN helpers than the minor projects. Findings on the variables #GIVEN should be examined with caution.

The multivariate and univariate tests of significance over this first set of helping variables for the fifty randomly selected projects are presented in Table II.4. The Multivariate F was significant at the .001 level and the hypothesis of no difference between projects was rejected. Univariate tests of significance suggested that the null hypothesis of no difference between project type be rejected for the variables #GIVEN (.001), #HELPERS (.001), #HELPO (.04) and %HELPERS-O (.002).

Special contrasts between the minor projects and major projects (see Table II.5) on this same set of helping variables revealed a significant multivariate F (.001) and significant univariate F for the variables (#HELPERS (.001), and #HELPO (.01)). Major projects did have a significantly greater number of helpers than the minor projects as hypothesized, but the %HELPERS-O was not significantly different.

TABLE II.5

Multivariate Special Contrasts: First Set of Helping Minor Projects vs. Major Projects Multivariate Tests of Significance Using Wilk's Lambda Criterion N=50

General Analysis	F (5,43) = 6.697	p .001

Univariate F Tests

Variable	F (1,47)	p
#GIVEN	0.013	.908
#HELPERS	20.901	.001
#HELPO	6.578	.014
%HELPERS-F	0.007	.933
%HELPERS-O	3.092	.985

Special contrasts between major projects and work projects (Table II.6) on the first set of helping variables revealed a significant multivariate F (.001), %HELPERS-F, (.03) and %HELPERS-O (.03). Work projects did have a greater #GIVEN helpers and less %HELPERS-O which was opposite to the direction hypothesized, but which on reflection appears logical since the help is usually provided on the job, by individuals whose ties to the learner are primarily through employment, not kinship or friendship. As indicated above, the finding that #GIVEN is significantly different should be taken with caution.

Table II.7 presents the means and standard deviations for the fifty randomly selected projects on the second set of helping variables (#SOUGHT, #HELPERS, #HELPMO, %HELPERS-R, %HELPERS-F).

Means, overall, tend to approximate those for the entire 114 projects with slightly greater differences between the projects on the #HELPMO and %HELPERS-R.

The multivariate and univariate tests of significance over this second set of helping variables for the fifty randomly selected projects are presented in Table II.8. The multivariate F was significant at the .001 level and the hypothesis of no difference between project types was rejected. Univariate tests of significance suggested that the null hypothesis of no difference between project

type be rejected for the new variables in this set #SOUGHT (.001) and #HELPMO (.001).

Special contrasts between major projects and work projects shown in Table II.9 on this set of variables revealed a significant multivariate F (.001) and significant univariate F tests for the new variables #SOUGHT (.001) and #HELPMO (.001). A significantly greater number of helpers were sought and provided sustained help for the major projects.

Special contrasts between major projects and work projects, shown in Table II.10 revealed a significant multivariate F (p .001) and significant univariate F-tests for the new variable #SOUGHT. Major projects did have a significantly greater number of helpers sought by the self-learners than the work projects, as hypothesized.

Tables II.11 through II.16 present cell means for each helping variable in a two way table (three project types and three clusters). Figures II.1 through II.6 plot these means.

Discussion

Project type, as measured only by the categories minor, major and work, did have a statistically significant effect upon the amount, source, and type of help a self-learner received for his learning projects. The type of project undertaken was apparently a significant influence

TABLE II.6

Multivariate Special Contrasts: First Set of Helping variables Major Projects vs. Work Projects Multivariate Tests of Significance Using Wilk's Lambda Criterion
N=50

General Analysis	F (5,43) = 23.96	p .001

Univariate F Tests

Variable	F (1,47)	p
#GIVEN	74.008	.001
#HELPERS	0.001	0.970
#HELPO	0.274	.603
%HELPERS-F	4.813	.033
%HELPERS-O	5.358	.025

TABLE II.7

Means and Standard Deviations for 50 Randomly Selected Projects on Second Set of Helping Variables

Project Type		#SOUGHT	#HELPERS	#HELPMO	%HELPERS-R	%HELPERS-F
1. Minor Projects (N=20)	M	1.75	2.05	1.40	30.00	47.75
	SD	1.12	1.15	0.88	44.13	46.69
2. Major Projects (N=20)	M	6.60	6.95	4.50	17.43	48.71
	SD	3.63	3.80	3.20	18.68	27.84
3. Work Projects (N=10)	M	2.10	7.00	5.00	20.79	18.52
	SD	2.89	5.16	3.68	16.34	18.74
Total (N=50)	M	3.76	5.00	3.36	23.13	42.29
	SD	2.73	3.39	2.66	31.30	35.52

TABLE II.8

MANOVA: Second Set of Helping Variables
Multivariate Tests of Significance Using Wilk's Lambda Criterion
N=50

General Analysis	F (10,86) = 12.69	p .001
Univariate F Tests		
Variable	F (2,47)	p
#SOUGHT	18.135	.001
#HELPERS	12.627	.001
#HELPMO	9.188	.001
%HELPERS-R	0.842	.437
%HELPERS-F	2.801	.071

TABLE II.9

Multivariate Special Contrasts on the Second
Set of Helping Variables
Minor Projects vs. Major Projects
Multivariate Tests of Significance Using
Wilk's Lambda Criterion
N=50

General Analysis	F (5,43)=6.508	p .001

Univariate F Tests Variable	F (1,47)	p
#SOUGHT	31.637	.001
#HELPERS	20.901	.001
#HELPMO	13.613	.001
%HELPERS-R	1.615	.210
%HELPERS-F	0.007	.933

TABLE II.10

Multivariate Special Contrasts: Second
Set of Helping Variables
Major Projects vs. Work Projects
Multivariate Tests of Significance Using
Wilk's Lambda Criterion
N=50

General Analysis	F (5,43)=22.775	p .001

Univariate F Tests

Variable	F (1,47)	p<
#SOUGHT	18.157	.001
#HELPERS	0.001	.970
#HELPMO	0.236	.629
%HELPERS-R	0.077	.783
%HELPERS-F	4.813	.033

TABLE II.11

Means for #HELPERS For 3 Project Types and 3 Clusters

		Project Type		
		Minor	Major	Work
Clusters	1	M=1.667 (N=3)	M=5.286 (N=17)	M=3.00 (N=1)
	2	M=2.143 (N=7)	M=7.545 (N=11)	M=8.25 (N=4)
	3	M=2.306 (N=36)	M=846 (N=26)	M=5.474 (N=19)

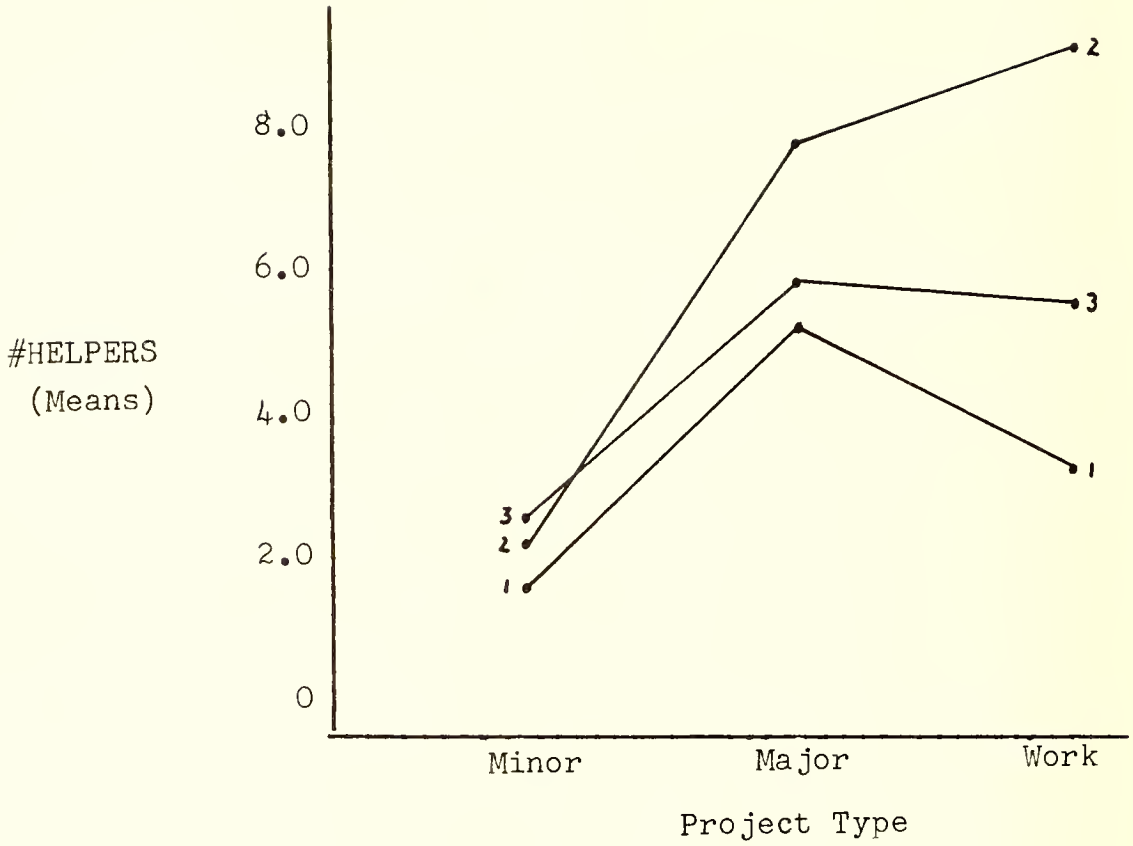


Figure II.1 Interaction of Cell Means for #HELPERS

TABLE II.12

Means For #HELPO For 3 Project Types and 3 Clusters

		Project Type		
		Minor	Major	Work
Clusters	1	1.000 N=3	1.857 N=7	1.000 N=1
	2	.857 N=7	2.273 N=11	3.250 N=4
	3	.806 N=36	2.423 N=26	1.789 N=19

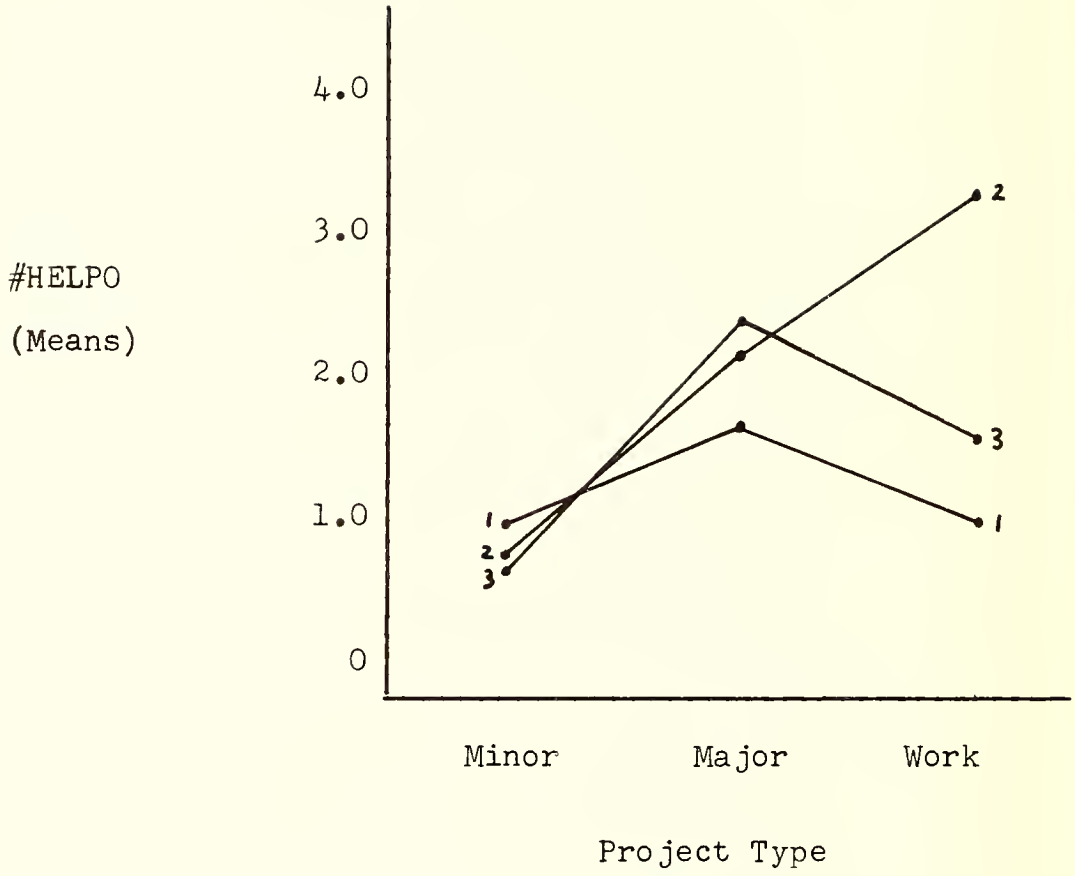


Figure II.2: Interaction of Cell Means for #HELPO

TABLE II.13

Means for #HELPMO For 3 Project Types and 3 Clusters

		Project Type		
		Minor	Major	Work
	1	.667 N=3	3.429 N=7	2.000 N=1
Clusters	2	1.286 N=7	5.273 N=11	5.000 N=4
	3	1.500 N=36	3.423 N=26	3.684 N=19

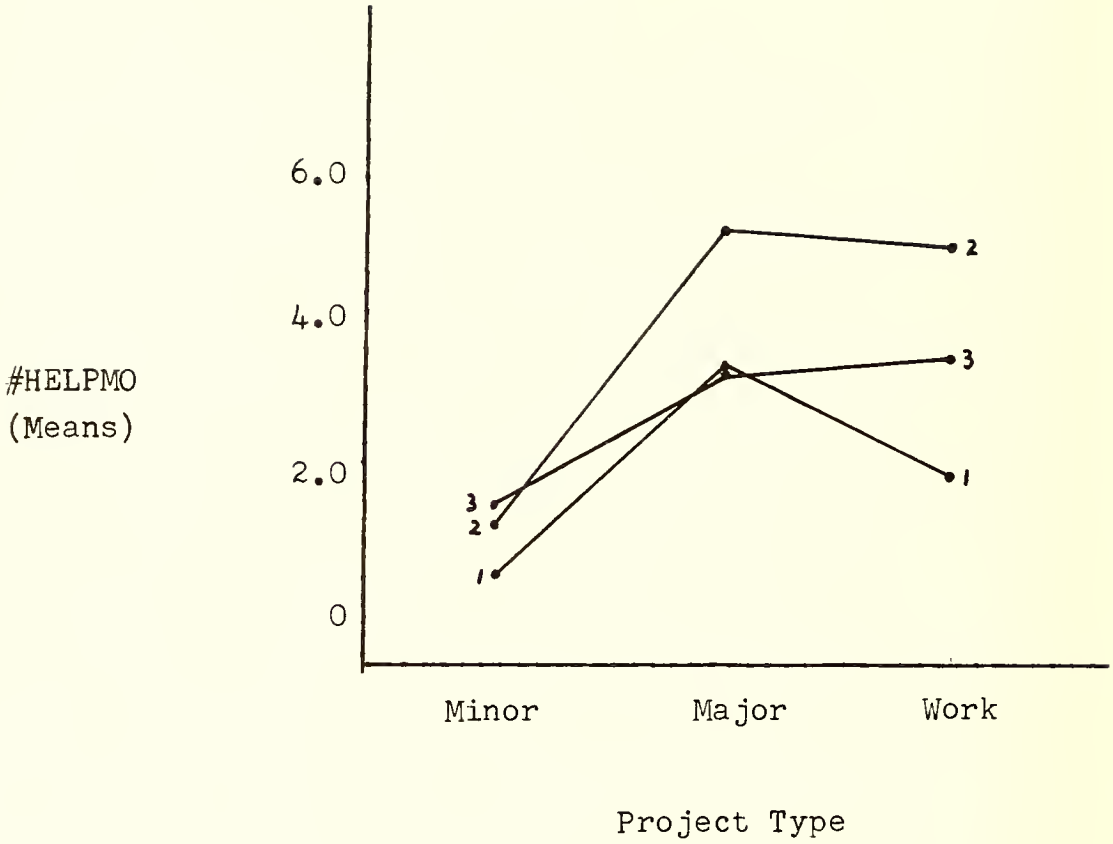


Figure II.3: Interaction of Cell Means for #HELPMO

TABLE II.14

Means for %HELPERS-R For 3 Project Types and 3 Clusters

		Project Type		
		Minor	Major	Work
Clusters	1	33.333 N=3	8.000 N=7	0.0 N=1
	2	28.571 N=7	11.636 N=11	42.750 N=4
	3	26.481 N=36	32.604 N=26	21.989 N=19

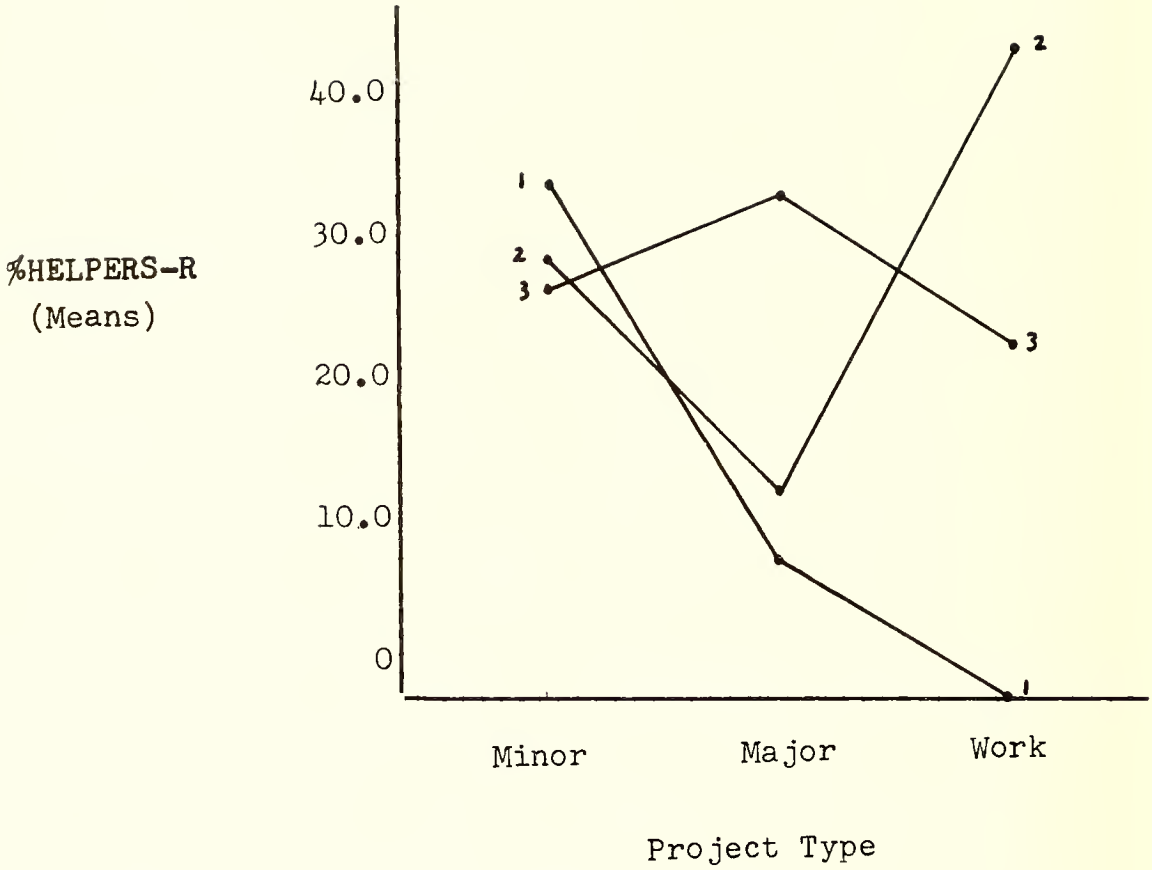


Figure II.4: Interaction of Cell Means for %HELPERS-R

TABLE II.15

Means For %HELPERS-F For 3 Project Types and Three Clusters

		Project Type		
		Minor	Major	Work
Clusters	1	50.000 N=3	78.4000 N=7	66.700 N=1
	2	42.857 N=7	62.236 N=11	13.075 N=4
	3	55.139 N=36	28.146 N=26	29.400 N=19

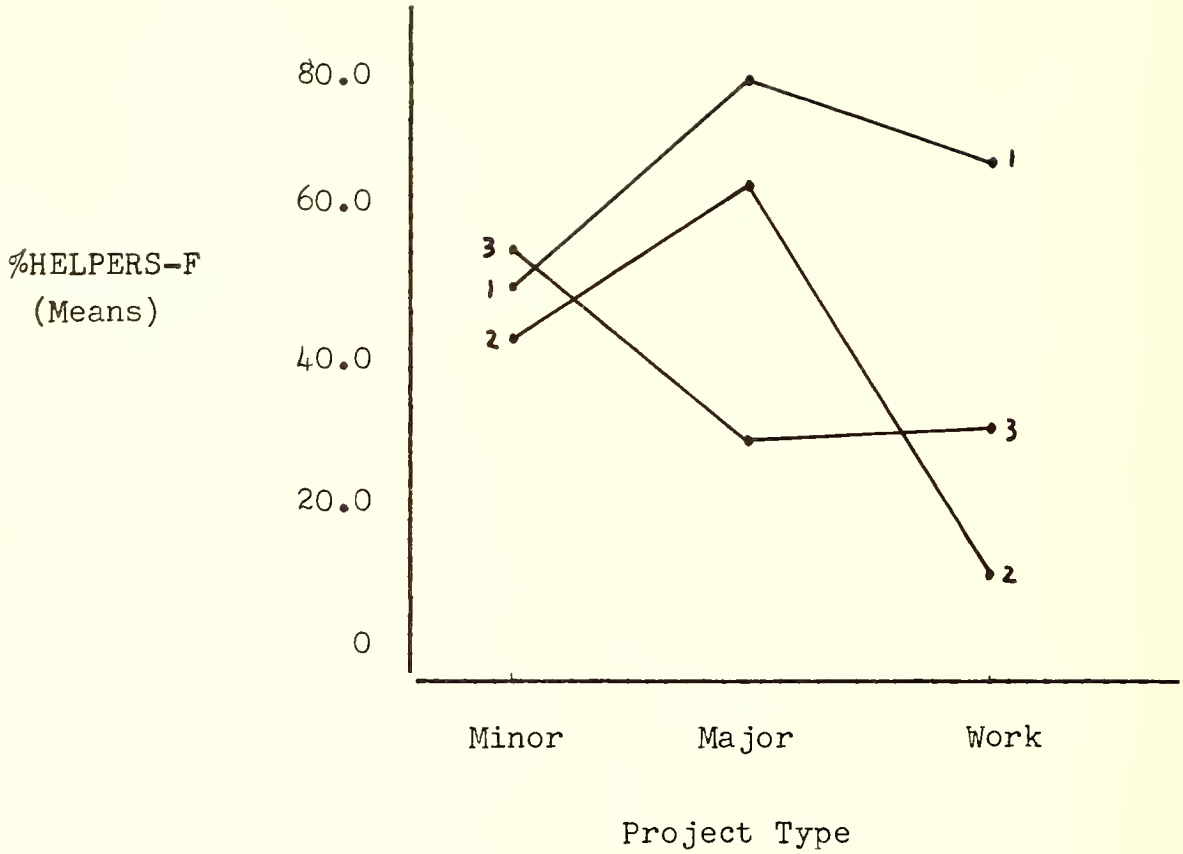


Figure II.5: Interaction of Cell Means for %HELPERS-F

TABLE II.16

Means For %HELPERS-O For 3 Project Types and 3 Clusters

		Project Type		
		Minor	Major	Work
Clusters	1	16.667 N=3	13.600 N=7	33.300 N=1
	2	28.571 N=7	26.155 N=11	44.175 N=4
	3	12.822 N=36	39.254 N=26	48.621 N=19

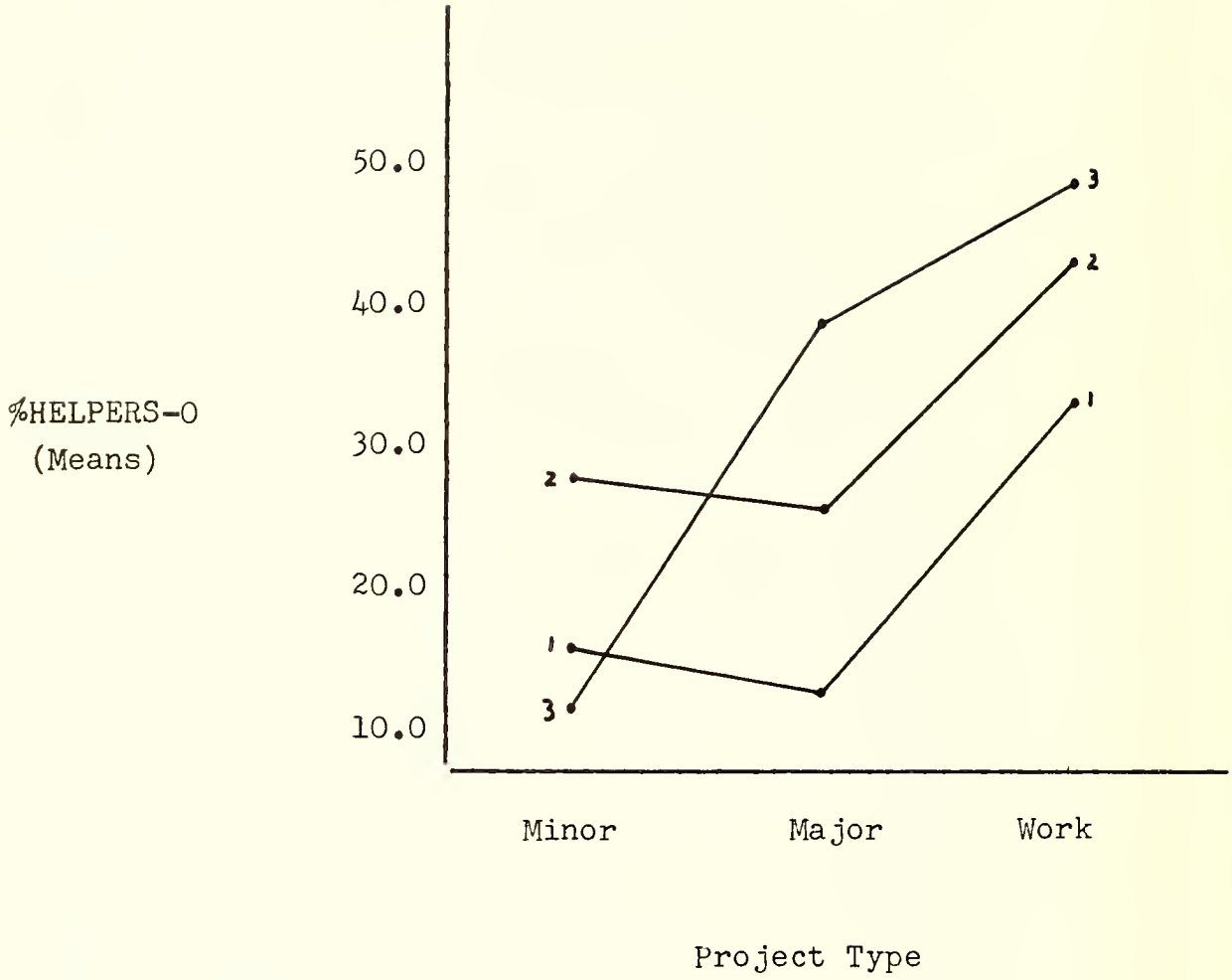


Figure II.6: Interaction of Cell Means for %HELPERS-O

on the amount and type of help obtained. The subjects received less help (#HELPERS overall, #HELPO, #HELPMO) for the minor projects. The number of helpers actually sought by the learner was greater for the major projects. Help was more often received without an active search for the work projects.

The plots of the means on the six helping variables, by project type and cluster, tentatively suggest that the two dimensions, network elements and project type, are relatively independent though both do have an effect on the amount, source and type of help received. The plots, however, were ambiguous enough to demand more detailed systematic inquiry. The dimension project type should be conceptualized and instruments should be devised to measure it. It is possible that this dimension could modify, enhance, or remove the independent effects which the structural characteristics of the networks alone may have. This possibility should be pursued in future research.

APPENDIX III

THE FIVE CLUSTER SOLUTION

Findings are seldom as tidy as the investigator would like them to be. This study is no exception. Chapter IV reported the results of the clustering procedures, which appeared to be the most appropriate for the data, and the results of the multivariate analysis of variances between the clusters on the six helping variables. These results were not significant. This appendix describes an alternate clustering solution for the data which was performed prior to the analysis reported in the main body of this dissertation. It is included here partly as balm to the investigator's desire to report significant findings, but primarily as a plausible alternate interpretation of the data which may prove to be of heuristic use in future research. It is entirely possible that given a different (and larger) sample of young non-college bound adults, this five cluster solution would be the best description of what configurations in social networks appear in the population. Since this appendix contains the results of a clustering solution which was <u>not</u> determined to be the most appropriate for the particular sample under investigation, the findings are reported in much less detail.

Eight variables, comprising the network profile for each subject were entered into the NORMIX clustering

procedure described in Chapter III. Maximum likelihood solutions for from 1 to 6 clusters were specified. The relevant data resulting from this procedure is presented in Table III. 1 and Figure III.1.

The chi square test of the log of the likelihood ratio between types indicated that from two to five clusters were significant. The best estimate for determing the number of clusters for a particular set of data is the log likelihood. Optimally one looks for the point at which there is the greatest increase in the log likelihood (the point at which an additional cluster maximizes the increase in the log likelihood) and subsequent likelihood estimates level off, indicating that additional clusters do not improve the estimate. Unfortunately, though the greatest increase in the log likelihood occurred between clusters two and three, the log likelihood did not level off, but continued to be maximized through the five cluster solution.

The five cluster solution was accepted because it did identify empirical clusters of networks which were reasonable and which had a sufficient number of subjects in them for subsequent analysis. Figure III.2 is a plot of the two best discriminant functions for each individual which resulted in maximum discrimination between the five clusters.

Each of the five clusters identified was characterized by scores on ten structural properties of the social net-

TABLE III.1

Results of NORMIX Clustering Procedure

# of Clusters	Log Likelihood	Log of Likelihood Ratio Between Types	Chi Square	df	p <
1	-1221.74 (15.31)*	---	--	--	--
2	-1206.43 (24.26)*	1/2 (15.310)	24.80	16	.07
3	-1182.17 (22.09)*	2/3 (24.258)	38.81	16	.001
4	-1160.08 (22.55)*	3/4 (21.286)	33.63	16	.006
5	-1137.53 (11.88)*	4/5 (23.352)	36.43	16	.003
6	-1125.65	5/6 (11.878	18.29	16	.31

*Numbers within parentheses refer to differences between the log likelihood for two clusters

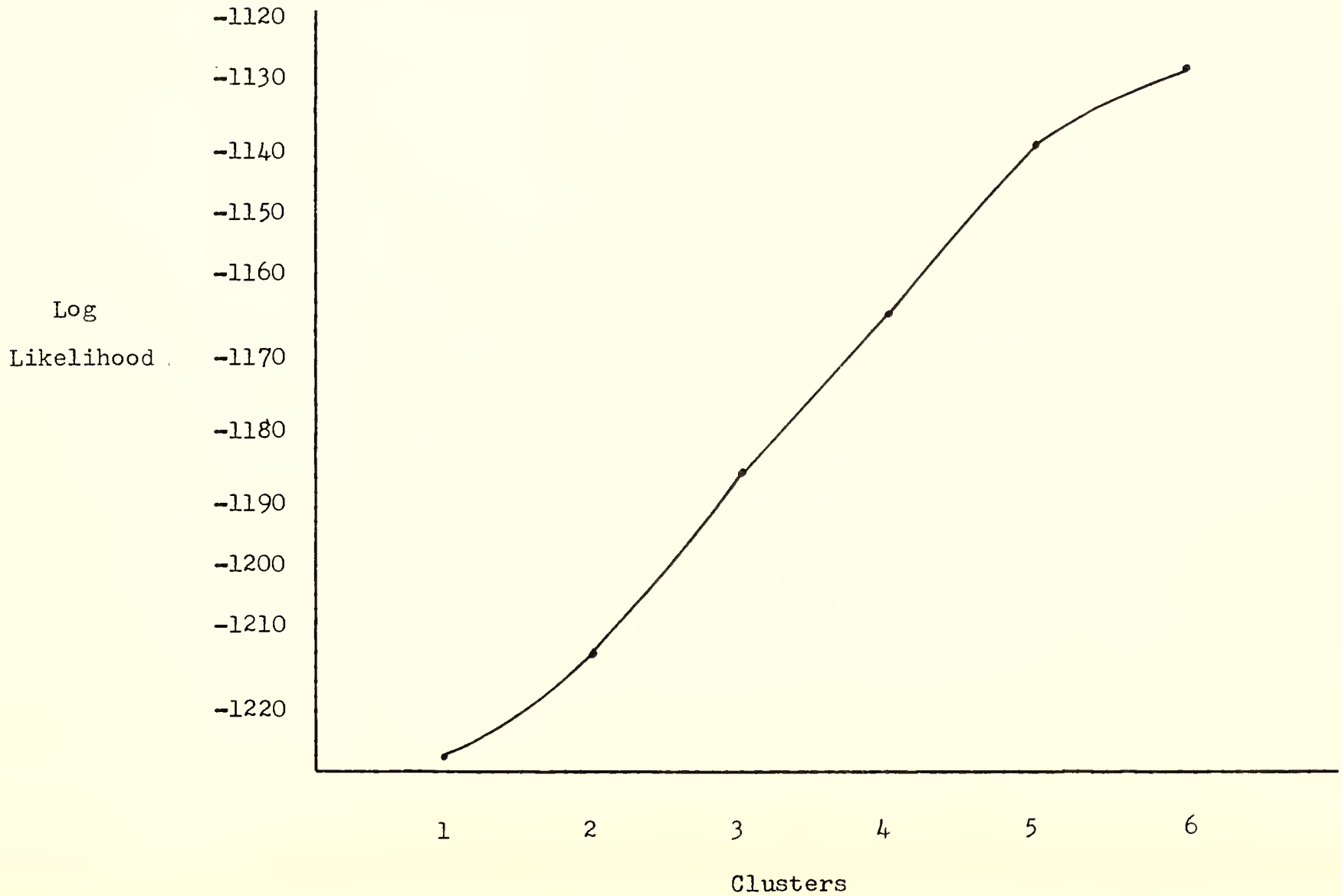


Figure III.1: Plot of the Log Likelihood for the NORMIX Clustering Procedure

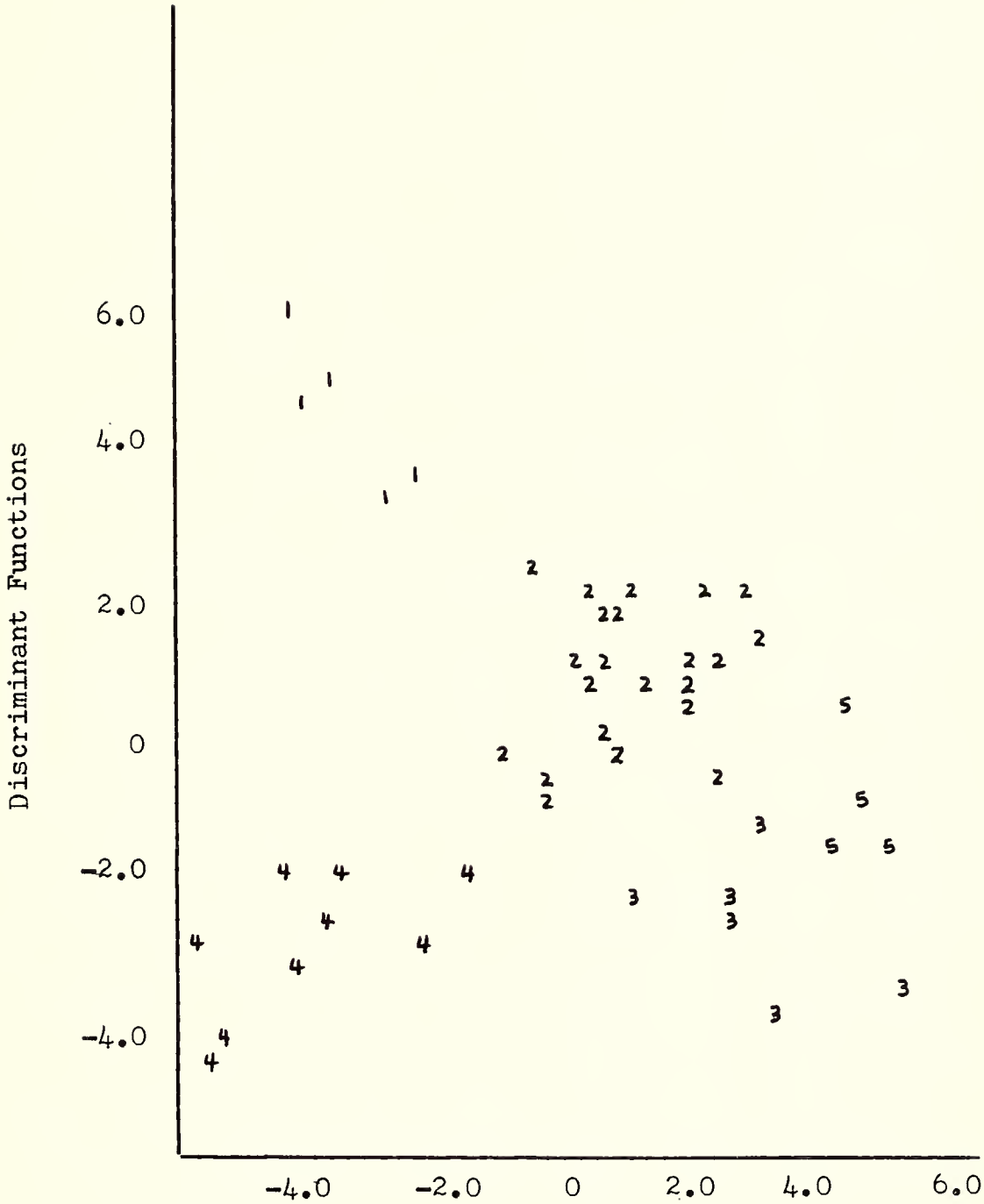


Figure III.2: Plot of Discriminant Functions 1 and 2 for the NORMIX Five Cluster Solution

works. Scores on the ten properties were standardized (Mean = 50, SD = 10) in order to facilitate comparison. Table III.2 presents the Means, Standard Deviations, and standard scores on each of the ten network properties that defined the five clusters. These ten scores form a profile for each cluster. Differences between the clusters' profiles are charted in Figure III.3 using standardized scores. Differences between cluster on the ten measures were significant: multivariate $F^{40}_{138} = 14.839$, p .001; univariate tests revealed that the clusters were significantly different on all ten measures at the .01 level.

Table III.2 and Figure III.3 reveal that two of the clusters (group 1 (N-5) and group 4 (N=10) are identical with clusters identified and described in Chapter IV. A third cluster (group 2 (N=25)), though smaller, is essentially the same in its characteristics as cluster 3, in the three cluster solution. The two additional clusters identified in this five cluster solution have been formed from sub-groups within the largest group (cluster 3, N=35) identified in Chapter IV.

The two new clusters were marked by the biggest difference in the extended and intimate networks. Cluster 3 (N=6) for example displays an average density score for the extended network below the mean for the sample. Its average density for the intimate network, however, is above the mean for the sample. This is due to the great difference in the composition of the two networks. While

TABLE III.2

Mean, SD, and Standard Scores (Z) on the 10 Network Variables for the Five Cluster Solution

		Clusters 1 (N=5)	2 (N=25)	3 (N=6)	4 (N=10)	5 (N=4)	Total Sample (N=50)
SIZE 1	M=	51.60	24.68	16.83	32.10	28.00	28.18
	SD=	3.78	8.24	6.11	5.63	5.06	11.31
	Z=	70.71	46.91	39.96	53.47	49.84	
DENSITY 1	M=	41.13	54.38	38.97	33.05	38.98	46.03
	SD=	11.44	16.62	6.73	5.05	6.51	15.63
	Z=	46.86	55.34	45.48	41.70	45.49	
%RELATIVES(1)	M=	22.74	36.79	28.03	14.44	26.58	29.04
	SD=	23.39	21.04	13.01	8.43	22.14	20.01
	Z=	46.85	53.87	49.50	42.70	39.05	
%FRIENDS (1)	M=	71.14	47.38	42.12	28.72	16.55	42.92
	SD=	23.60	24.09	15.44	11.13	15.33	24.09
	Z=	61.71	51.85	49.67	44.10	39.05	
%OTHERS (1)	M=	6.12	15.82	29.87	56.16	56.90	27.89
	SD=	6.13	12.31	11.14	11.91	15.01	22.02
	Z=	40.11	44.52	50.90	62.83	63.17	
SIZE 2	M=	48.40	19.48	7.00	22.70	12.25	20.94
	SD=	5.60	6.10	2.61	5.62	4.35	11.72
	Z=	73.43	48.75	38.11	51.50	42.49	
DENSITY 2	M=	40.44	54.38	71.57	36.83	65.20	52.70
	SD=	12.70	19.08	22.41	13.53	16.68	20.42
	Z=	44.00	50.82	59.24	42.23	56.12	
%RELATIVES(2)	M=	20.28	35.68	0.00	6.72	46.90	24.96
	SD=	24.99	26.88	0.00	11.38	38.37	27.63
	Z=	48.31	53.88	40.97	43.40	57.94	
%FRIENDS (2)	M=	76.24	58.89	97.92	42.27	43.75	60.77
	SD=	25.58	28.89	5.10	14.38	46.21	30.37
	Z=	55.09	49.38	62.33	43.91	44.40	
%OTHERS (2)	M=	3.48	5.29	2.08	51.02	9.40	14.20
	SD=	4.77	7.53	5.10	14.08	10.82	20.61
	Z=	44.80	45.68	44.12	67.87	47.67	

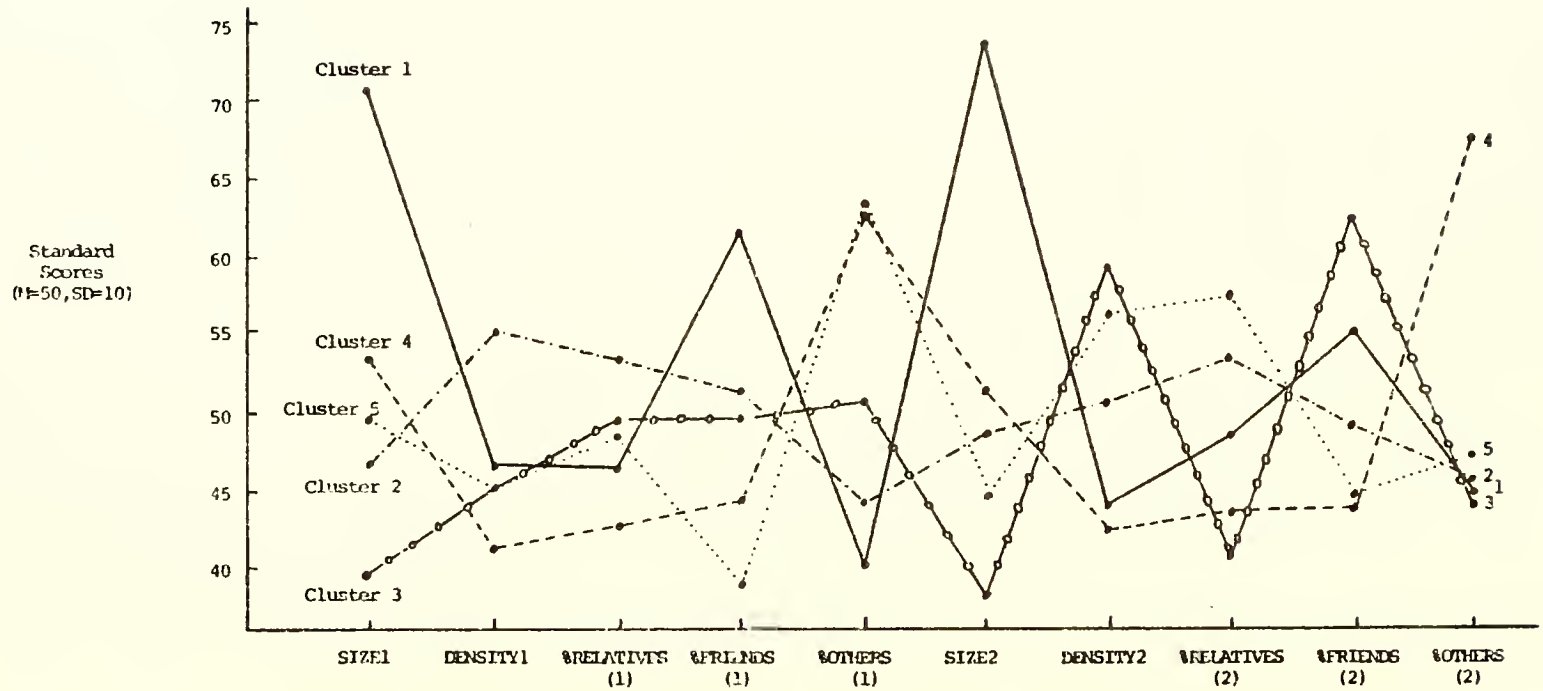


Figure III.3: Profile of 10 Network Characteristics for Five Clusters

the proportion of relatives and others is about average in the extended network, they are virtually non-existant in the intimate network which is dominated by the largest proportion of friends (97.92 percent) of any cluster. Another distinguishing characteristic of cluster 3 is that it has the smallest size for both the extended and intimate network of any of the other clusters.

Similarly, cluster 5 (N=4) shows the largest drop in size and the greatest increase in density from the extended to intimate network of any of the other clusters. Thhis is primarily due to the fact that "others have been omitted from the intimate network which is composed primarily of relatives (46.90 percent) and friends (45.75 percent). This cluster is also distinguished from the others by the lowest proportion of friends and highest proportion of others in the extended network, and highest proportion of relatives in the intimate network.

Multivariate analysis of variance was used to test the hypothesis of no difference between the five clusters on the helping variables. Since some of the dependent variables were ipsative measures (all composition scores for each subject added up to 1.0) two separate analyses were performed. The means and standard deviations on all the helping variables for the five clusters are presented in Table III.3. Results of the multivariate and univariate significance tests are presented in Tables III.4 and III.5.

TABLE II.3

Means and Standard Deviations for 5 Groups (Network) Clusters on the Entire Set of Helping Variables (#HELP, #HELPO, #HELPMO, %HELPERS-R, %HELPERS-F, %HELPERS-O)

Clusters		#HELPERS	#HELPO	#HELPMO	%HELPERS-R	%HELPERS-F	%HELPERS-O
1	M	7.40	3.20	4.40	18.28	63.40	18.32
(N=5)	SD	1.18	1.10	1.52	19.64	10.13	12.96
2	M	9.12	3.68	5.56	22.67	44.34	32.99
(N=25)	SD	4.94	2.90	3.70	22.09	26.26	21.61
3	M	7.33	2.50	4.83	14.35	24.37	61.27
(N=6)	SD	1.21	2.17	2.14	10.84	22.45	20.44
4	M	12.10	4.30	8.20	13.12	50.16	36.73
(N=10)	SD	6.33	3.40	5.63	9.91	28.33	24.52
5	M	10.75	5.75	5.00	34.35	22.75	42.93
(N=4)	SD	6.65	5.12	3.46	37.39	15.22	27.34
Total	M	9.46	3.78	5.84	20.26	43.29	36.46
(N=50)	SD	5.00	3.01	3.94	20.16	26.24	23.66

TABLE II.4

MANOVA: First Set of Helping Variables (#HELPERS, #HELPMO, %HELPERS-F, %HELPERS-O) For 5 Network Clusters

Multivariate Tests of Significance Using Wilk's Lambda Criterion

N-50

General Analysis	F (16,128) = 1.67	p .046

Univariate F Tests Variable	F (4,45)	p
#HELPERS	1.304	.283
#HELPMO	1.269	.296
%HELPERS-F	2.611	.048
%HELPERS-O	3.020	.027

TABLE II.5

MANOVA: Second Set of Helping Variables (#HELPERS, #HELPO, %HELPERS-R, %HELPERS-F)
Multivariate Tests of Significance Using Wilk's Lambda Criterion
N=50

General Analysis	F (16,128) = 1.667	p .046
Univariate F Tests		
Variable	F (4,45)	p
#HELPERS	1.304	.283
#HELPO	0.818	.521
%HELPERS-R	1.036	.399
%HELPERS-F	2.611	.048

In both cases, the MANOVA procedure revealed a significant multiple F (p .046) indicating that the mean scores for the clusters on the helping variables did differ significantly. Univariate tests revealed that the clusters were significantly different on the variables %HELPERS - FRIENDS and %HELPERS - OTHERS.

APPENDIX IV

COMPARISON OF CLUSTER ANALYSIS (MIKCA) WITH ARBITRARY GROUPING PROCEDURES

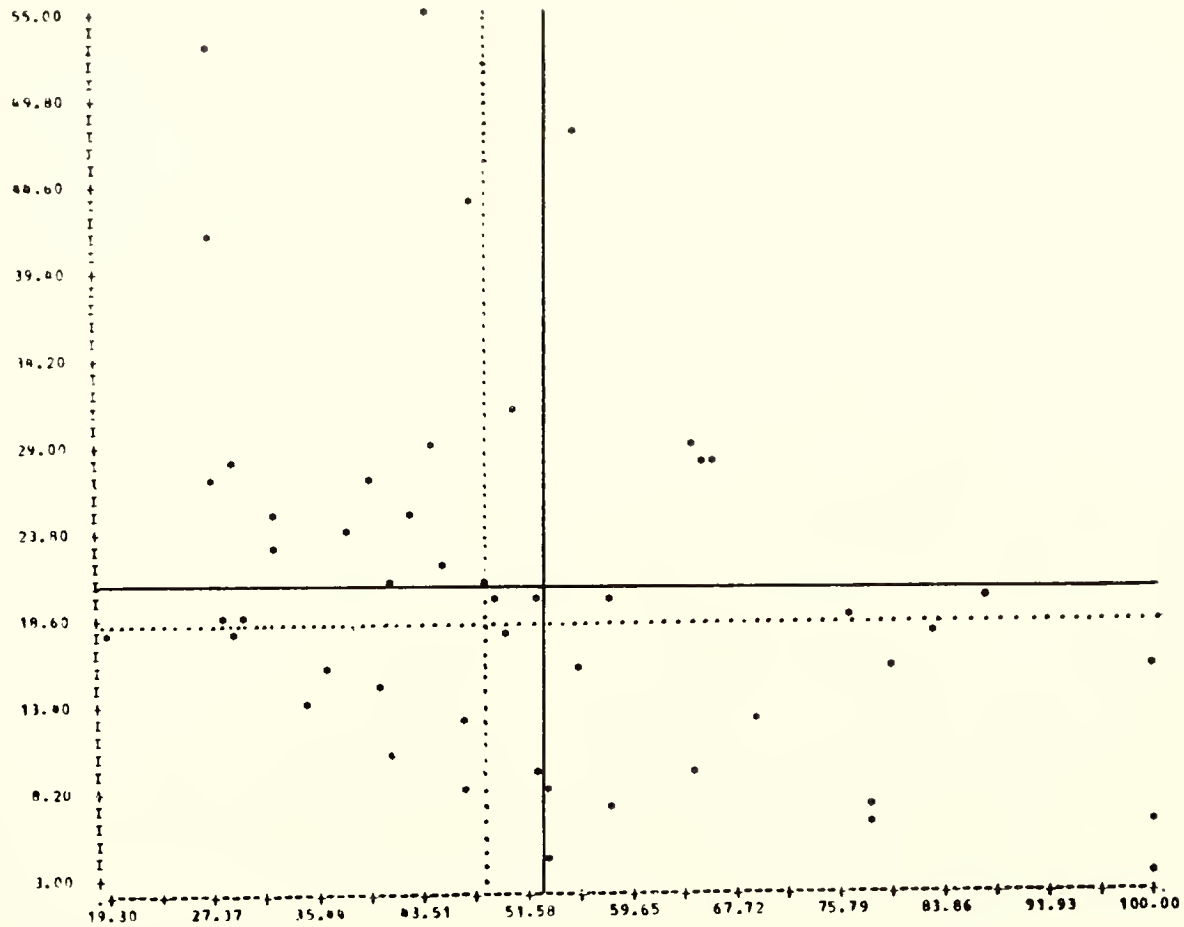
The purpose of this appendix is to illustrate the difference between the results obtained using a cluster procedure and more commonly used grouping techniques. In this illustration, only two variables are used (SIZE 2 and DENSITY 2) so that the results of the grouping procedures could be plotted on a two dimensional graph. The following figures show the computer printout from the SPSS procedure SCATTERGRAM. SCATTERGRAM produces a graph showing the relationship between two variables; in this case, SIZE 2 on the vertical axis and DENSITY 2 on the horizontal axis. The scores on each of these variables are plotted for each of the fifty subjects (represented by an asterisk (*)) in this study.

Figure IV.1 shows the results of two arbitrary dichotomizations of the subjects commonly performed when a random sample provides data which is then to be used in an analysis of variance procedure. Subjects are grouped as to whether they are high or low on the variables and comparisons are then made between the two groups. Frequently, there is no other criteria used in this arbitrary grouping of the subjects except that of attempting to place an approximately equal number of subjects in the cells

SIZE 2

(M=20.94,

Med=19.17



DENSITY 2

(M=52.70, Med. = 48.45)

Figure IV.1. Grouping on the Basis of Cut Points on the Mean and Median for SIZE 2 and DENSITY 2.

of the resulting four-fold table . It should be noted that dichotomization on the means or medians of the two variables does not guarantee that the resulting groups have a high degree of "natural association" among themselves, or that the groups are "relatively distinct" from one another.

Figures IV.2, IV.3, and IV.4 show the results of clusters established using the MIKCA clustering procedure (described in Chapter III). The criterion used to establish three, four, and five clusters is to minimize the within cluster variance. Nothing is said here about which cluster solution is best for this data. As noted in Chapter III, describing cluster analysis, determination of the best cluster solution is often difficult and in this case would depend upon the values of the criterion measure (/W/) for cluster solutions which are not presented (one, two, six, and seven clusters). The cluster solutions shown in the following figures are merely presented to point out the difference between cluster analysis solutions based on some objective criteria and the arbitrary grouping of the subjects illustrated in Figure IV.1.

Note that using only two variables (SIZE 2 and DENSITY 2) none of the groups established in Figure 1 (dividing the subjects into groups of high and low on the basis of the mean or median) are anything like the clusters

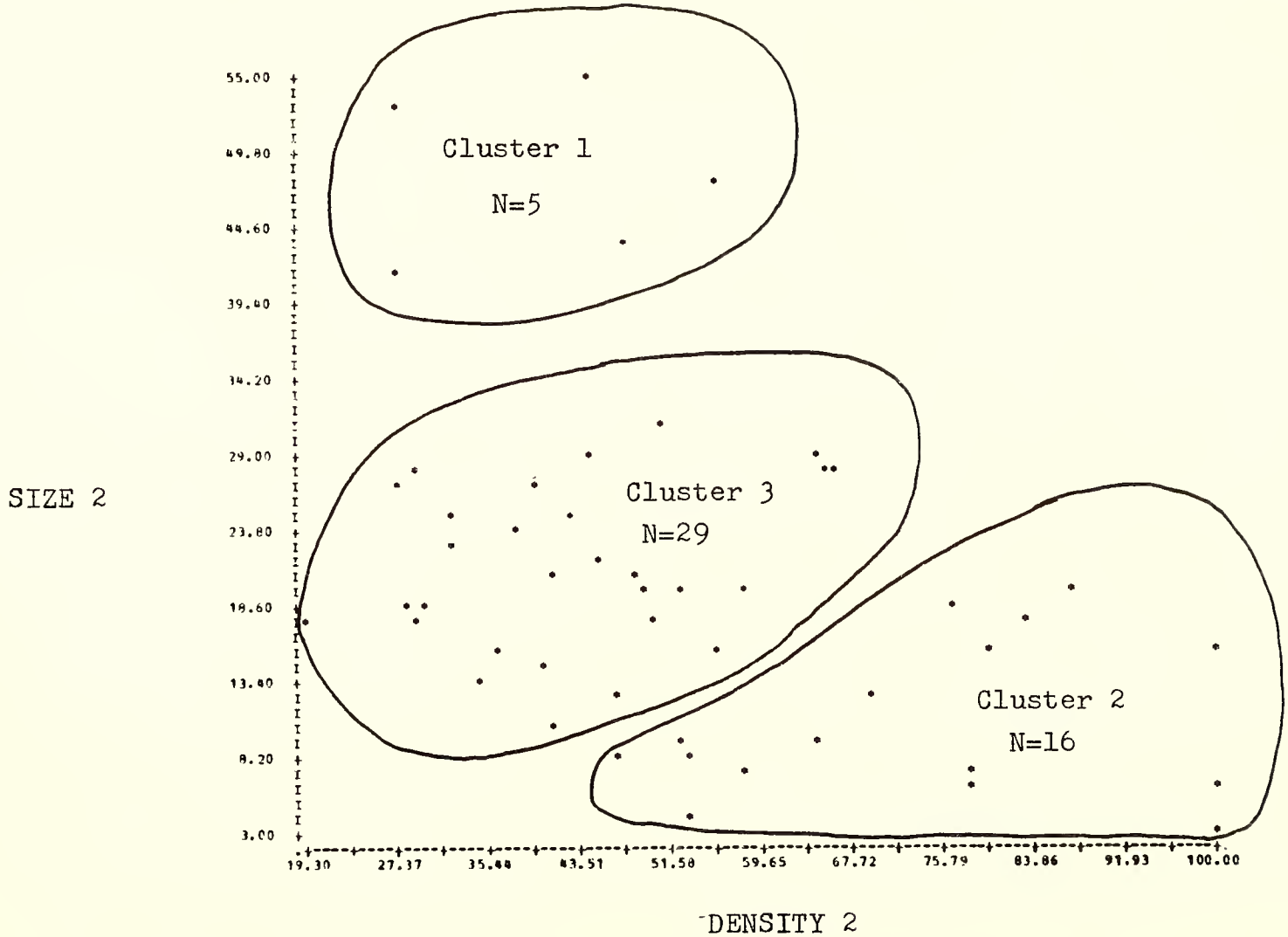


Figure IV.2: Three Cluster Solution; Criterion Minimize /W/

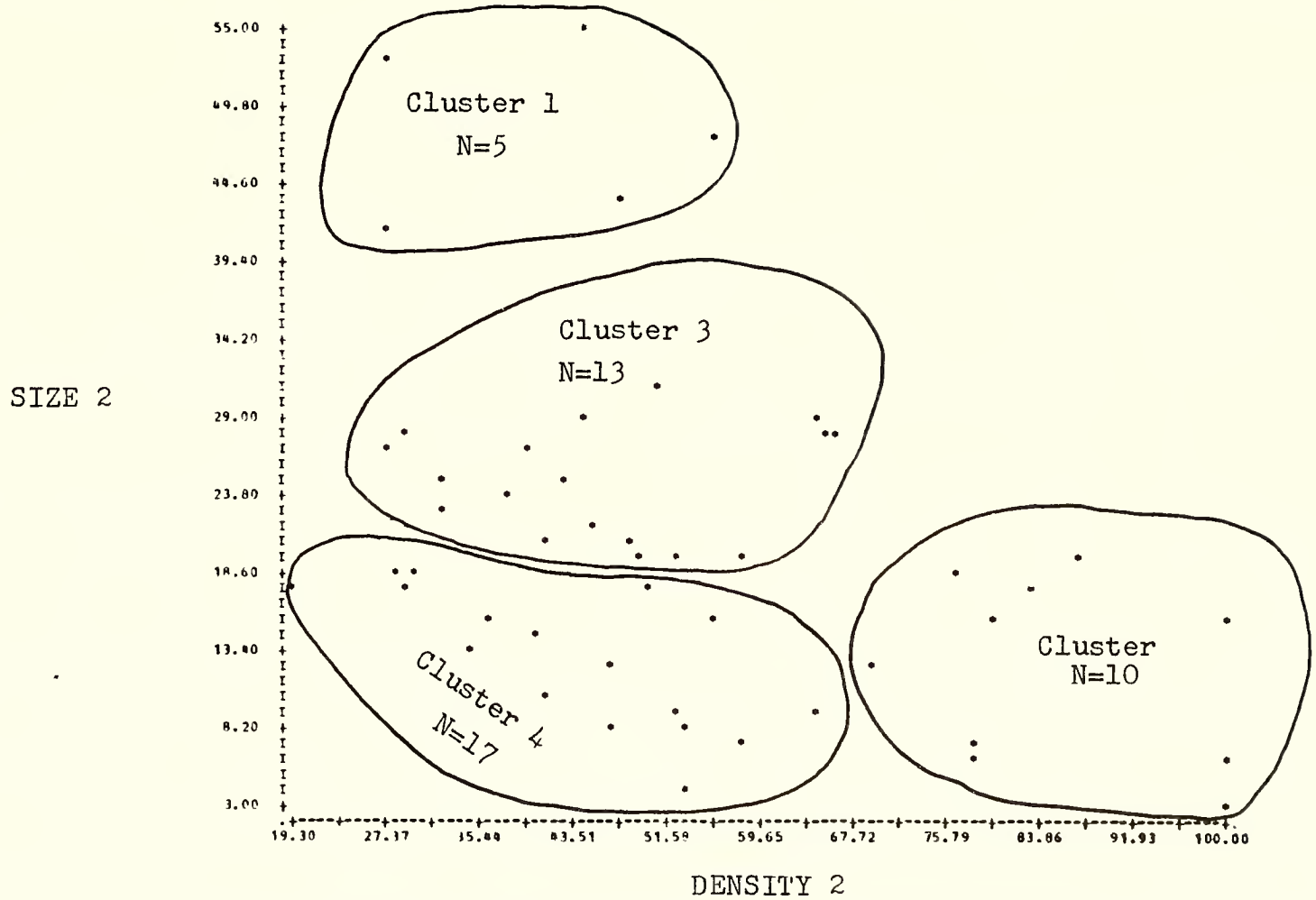


Figure IV.3: Four Cluster Solution; Criterion Minimize /W/

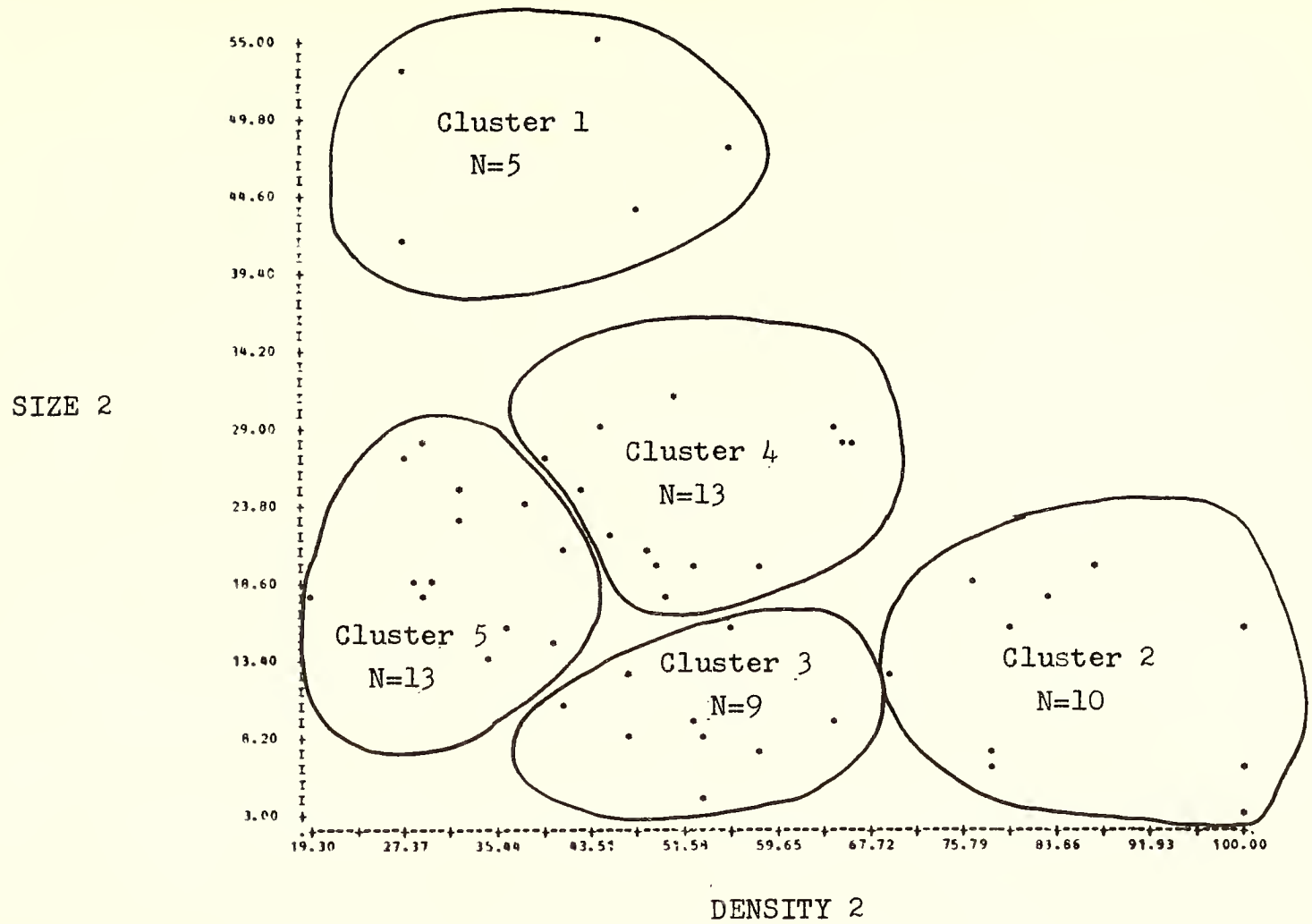
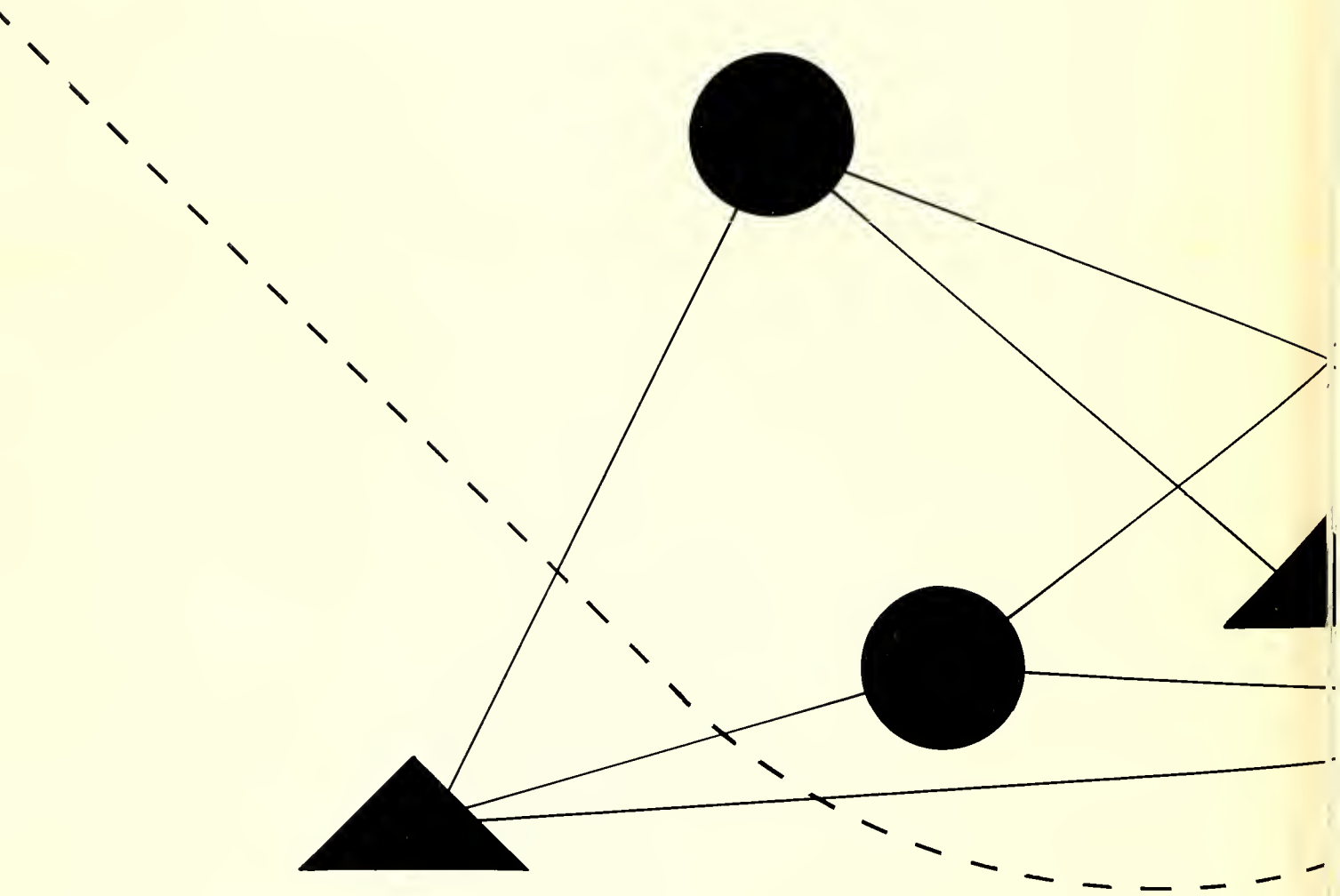


Figure IV.4: Five Cluster Solution; Criterion Minimize /W/

identified by the three, four, or five cluster solutions. It is obvious that if the goal of grouping is to establish homogeneous clusters of subjects, the cluster procedure is superior. In addition, any method of arbitrarily establishing cut points automatically sets the number of groups that subsequent analysis will be performed on. In Figure IV.1, for example, where the two variables are dichotomized, we have arbitrarily established four clusters. There may, in fact, be only two, or five clusters in the data, but there is no way to determine this.

The advantages of cluster analysis are even more apparent when the problem of classification involves more than two variables. For one thing, plotting the data beyond two variables is not feasible. Further, by arbitrarily setting the number of groups one magnifies the possibility of misclassifying the subjects. Clustering procedures, on the other hand, are multivariate and can use their criteria (such as the /W/) on the centroids of multivariate distributions.